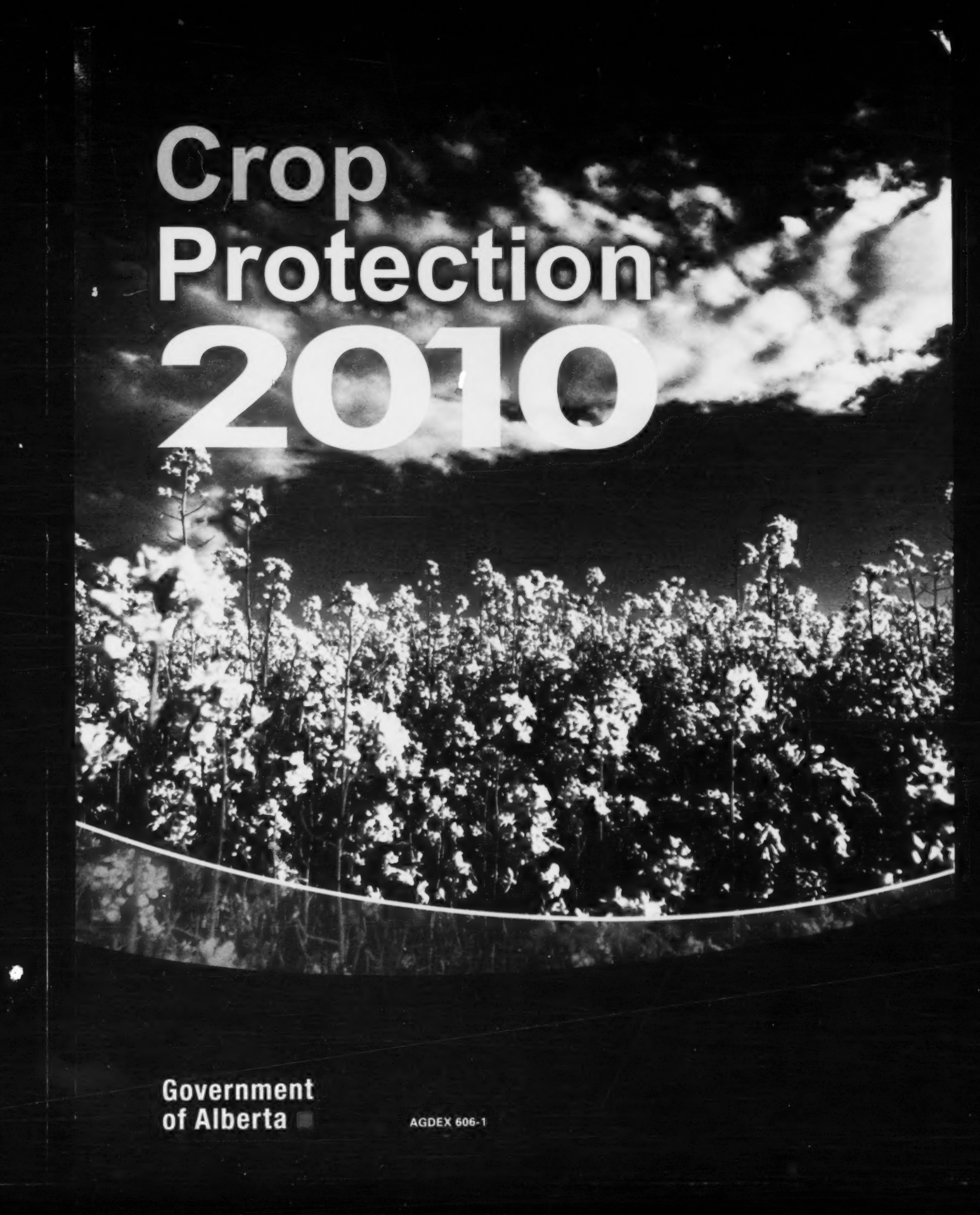




Crop Protection 2010

Government
of Alberta ■

AGDEX 606-1

Disclaimer

This publication is intended to be used as a guide only. Information contained here is that available at the time of printing (February 2010). While every effort has been made to ensure accuracy, Alberta Agriculture and Rural Development does not accept responsibility for label changes, errors in conversion or otherwise. It remains the responsibility of the readers to follow product information contained on the product label or package insert. The publisher, editor and all contributors to this publication cannot be held responsible for publication errors or any consequence resulting from the use of this publication.

Note: Some approved minor use registrations may not appear on the product label. Check with product write-up for details.

All recommendations in this publication are given in quantity of commercial product per acre (L or kg/ac). Product labels are given in quantity of product per hectare (L or kg/ha). To avoid application errors, be sure to read and understand label recommendations.

Warning

The use of a pesticide in any manner not published on the label or registered under the *Minor Use of Pesticides* regulation constitutes an offence under both the *Federal Pest Control Products Act* and *Alberta's Environmental Protection and Enhancement Act*.

Questions or concerns, contact:

Alberta Ag-Info Centre
Phone: 310-FARM (3276)

Copies of this publication may be obtained from:

Publications Office
Alberta Agriculture and Rural Development
Phone: 1-800-292-5697 (toll free in Canada)
(780) 427-0391

or

see our website <www.agriculture.alberta.ca> for information on other publications, videos and CD-Roms

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CROP PROTECTION 2010

Edited by

Harry Brook and Mark Cutts

Alberta Agriculture and Rural Development
in co-operation with the agro-chemical industry

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Address and Telephone Numbers

Chemical Companies

Adjuvants Plus Inc.

1755 Division Road North
Kingsville, ON N9Y 2Y8
Toll Free: 1-877-512-4659

Arysta LifeScience Canada, Inc.

998, 105 - 150 Crowfoot Crescent N.W.
Calgary, AB T3G 3T2
Toll Free: 1-866-761-9397
Fax: 1-866-231-8957
Website: arystalifescience.com

BASF Canada

100 Milverton Drive, 5th Floor
Mississauga, ON, L5R 4H1
(416) 675-3611 Toll Free: 1-877-371-2273
Website: www.agproducts.basf.com

Bayer CropScience Inc.

#100, 3131 - 114 Avenue S.E.
Calgary, AB T2Z 3X2
1-888-283-6847
Website: www.bayercropscience.ca

Cheminova Canada

5915 Airport Road, Suite 316
Mississauga, ON L4V 1T1
(905) 405-1923 Toll Free: 1-888-316-6260
Website: www.cheminova.com

Chemtura Co.

25 Erb Street
Elmira, ON N3B 3A3
1-800-350-1745

Dow AgroSciences Canada Inc.

#2100, 450 - 1 Street S.W.
Calgary, AB T2P 5H1
Toll Free: 1-800-667-3852
24 Hour Emergency: 1-613-996-6666
Website: www.dowagro.ca

E.I. duPont Canada Co.

4444 - 72 Avenue S.E.
Calgary, AB T2C 2C1
Toll Free: 1-800-667-3925
Website: www.dupont.ca/ag

Engage Agro Corporation

1030 Gordon Street
Guelph, ON N1G 4X5
(519) 826-7878 Toll Free: 1-800-900-5487
Website: www.engageagro.com

Gowan Company

P.O. Box 5569
Yuma, AZ 85366-5569
Toll Free: 1-800-833-5720
Website: www.gowanco.com

Interprovincial Co-operatives Ltd.

945 Marion Street
Winnipeg, MB R2J 0K7
(204) 233-3461
Website: www.ipco.ca

MANA Canada

56 Hampton Crescent
London, ON N6H 2N9
(519) 601-1945
For product service call -
United Agri-Products Canada Inc,

Monsanto Canada Inc.

67 Scurfield Blvd.
Winnipeg, MB R3Y 1G4
Toll Free: 1-800-667-4944
Website: www.monsanto.ca

Norac Concepts Inc.

P.O. Box 31097
Guelph, ON N1H 8K1
(519) 821-3110
24 Hour Emergency: (613) 787-5620
Website: www.noracconcepts.com

Nufarm Agriculture Inc.

5507 - 1st Street S.E.
Calgary, AB T2H 1H9
Toll Free: 1-800-868-5444
24 Hour Emergency: 1-800-424-9300
Website: www.nufarm.ca

Peacock Industries Inc.

Box 750
Hague, SK S0K 1X0
(306) 225-4691
Website: www.grasshoppercontrol.com

Syngenta Crop Protection Canada Inc.

#300, 6700 MacLeod Trail South
Calgary, AB T2H 0L3
Toll Free: 1-877-964-3682
24 Hour Emergency: 1-800-327-8633
Website: www.syngenta.ca

United Agri Products Canada Inc.

789 Donnybrook Drive
Dorchester, ON N0L 1G5
Info Line: 1-800-561-5444
24 Hour Emergency: 1-800-561-8273
Website: www.uap.ca

Valent Canada, Inc.

107 Woodlawn Road West, Suite 502-B
Guelph, ON N1H 1B4
(519) 822-7043
www.valent.ca

Pest Management Regulatory Agency

The Pest Management Regulatory Agency (PMRA) of Health Canada is responsible for providing safe access to pest management tools, such as pesticides and sustainable pest management strategies, while minimizing risks. The Agency registers all pest control products that may be used in Canada. It also re-evaluates the existing pesticides available to the agriculture, forestry, manufacturing and other sectors. PMRA's risk-management approach to regulatory decision-making involves objective, scientific assessment of the risks to human health and the environment, while considering the need for a pest control product. With this approach, growers and consumers are better protected and have access to the information regulatory decisions are based on.

If there are questions or inquiries regarding pesticides, product labels or safety precautions, contact PMRA at the following phone numbers:

Edmonton (780) 495-7014

Calgary (403) 292-4106

Lethbridge (403) 382-4794

National toll free number: 1-800-267-6315 – Pest Management Information Service

Visit our website: www.pmra-arla.gc.ca

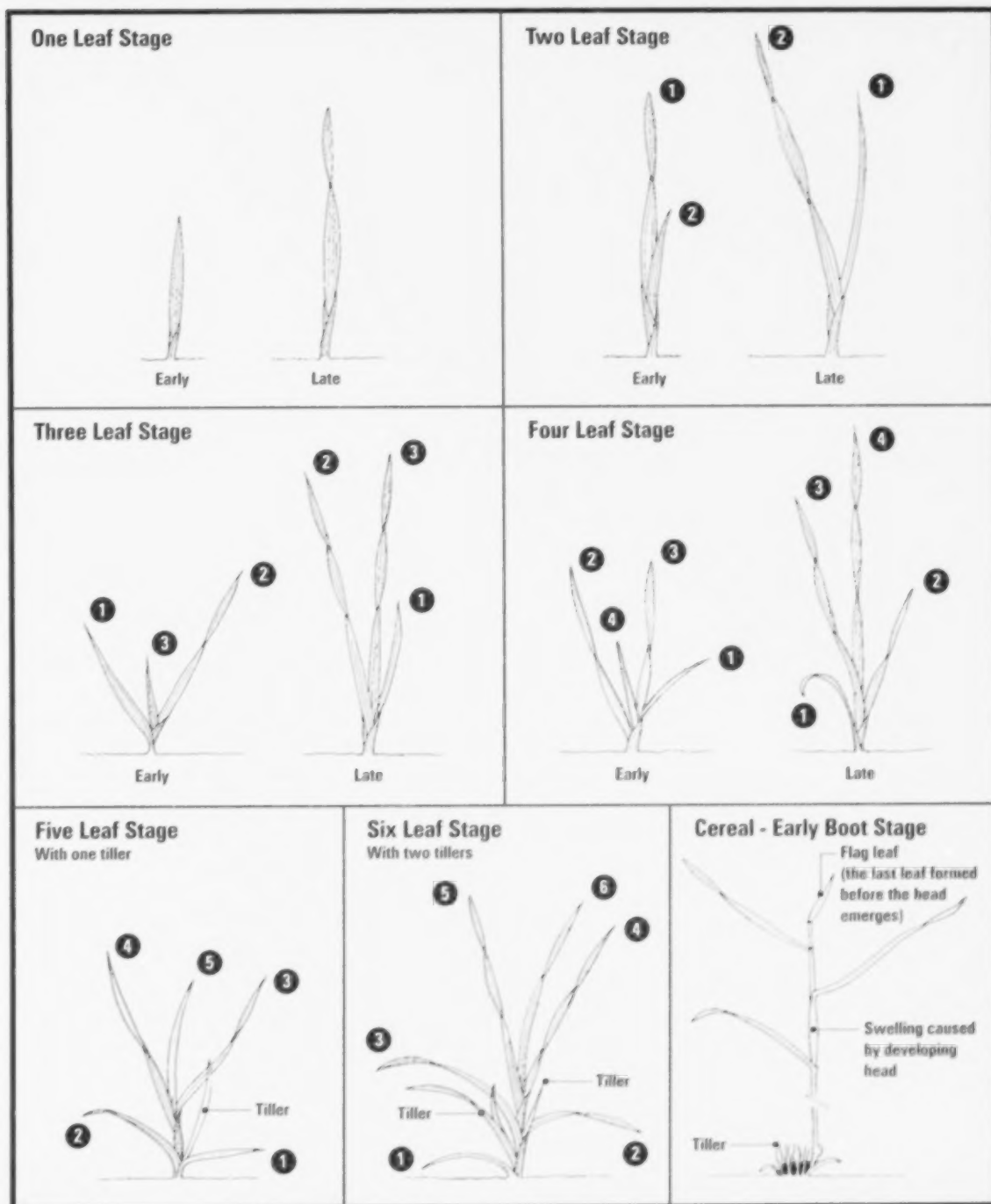
On line versions of the current labels are available via the following link:

http://pr-rp.pmra-arla.gc.ca/portal/page?_pageid=34,17551&_dad=portal&_schema=PORTAL or

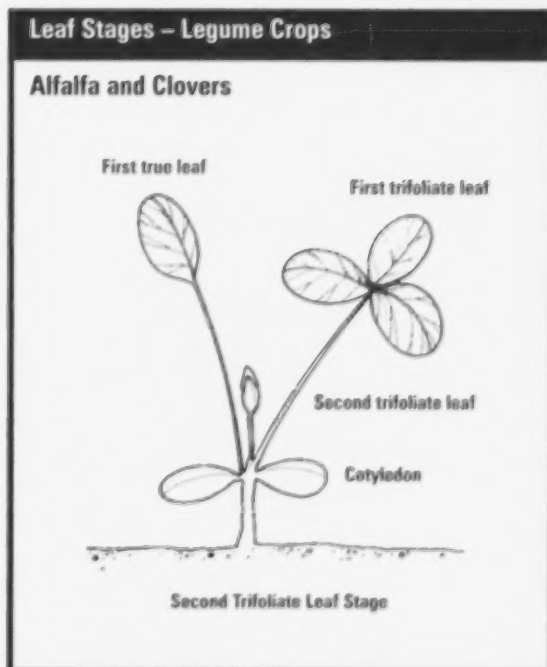
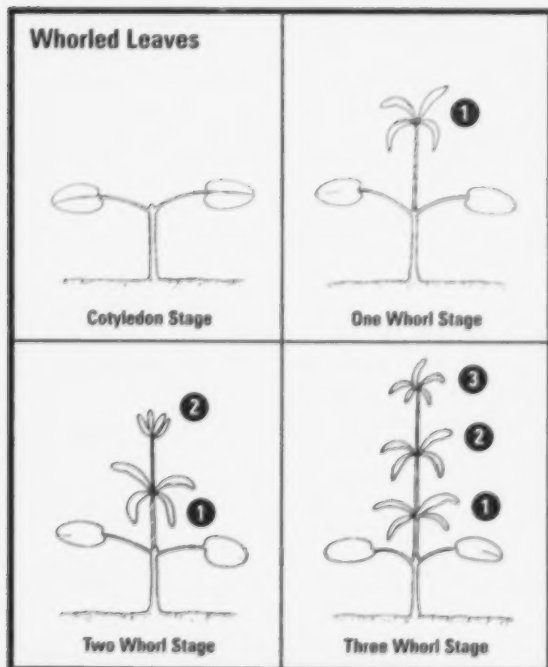
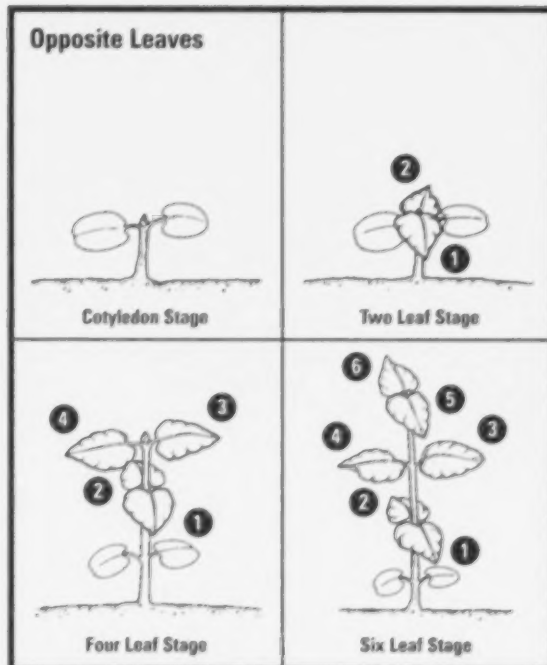
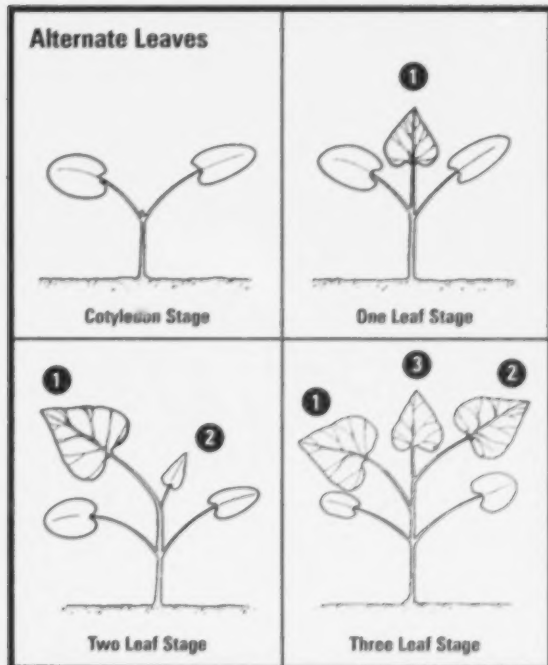
go to the PMRA Homepage at

<http://www.pmra-arla.gc.ca/english/index-e.html> then select "Quick links" and then select "Label Search" and save it on your favourites.

Leaf Stages – Cereals and Grasses

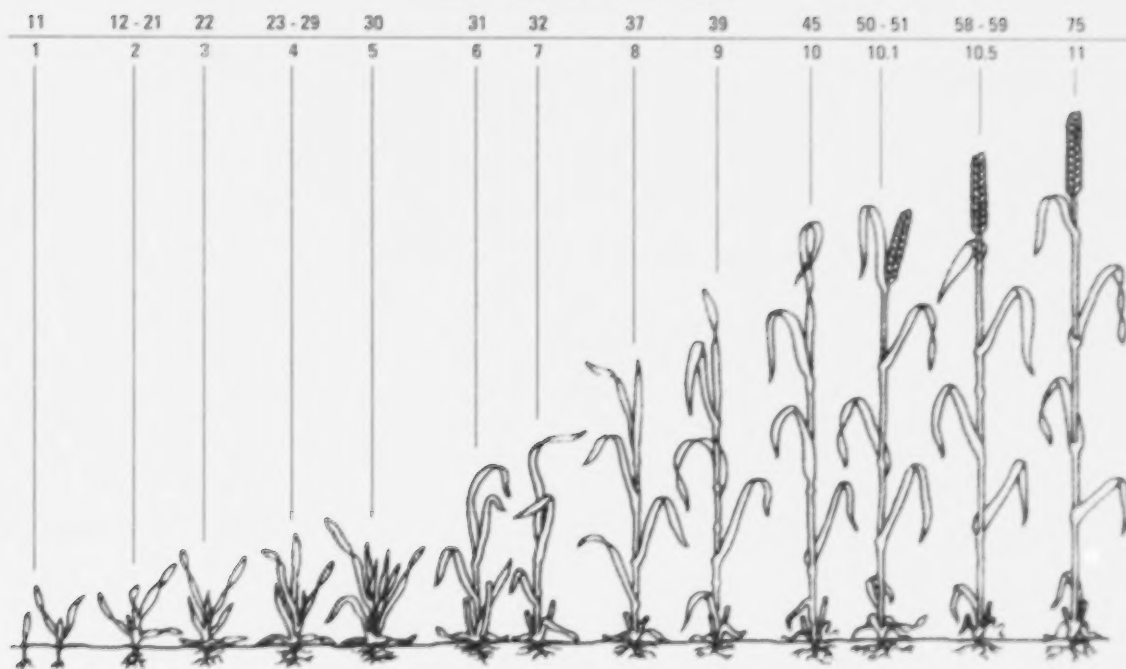


Leaf Stages – Broadleaf Weeds



Cereal Growth Stages

Zadoks Decimal Growth Stages



Feekes Large Growth Stages

One leaf	Two tillers formed	Leaf sheaths strongly erect	Second node detectable	Ligule of flag leaf just visible	First ear just visible	Ripening
	Tillering begins	Leaf sheaths lengthen	First node detectable	Flag leaf just visible	Boots swollen	All ears out of sheath

The Feekes and Zadoks scales define the growth stages of a relatively uniform cereal crop. Completion of these growth stages by the cereal crop will be influenced greatly by soil temperature, moisture, air temperature and day length. For example, stages 2 to 5 in the Feekes scale may take 5 or 6 weeks, whereas stages 6 to 10 may be completed in 2 to 3 weeks under prairie conditions.

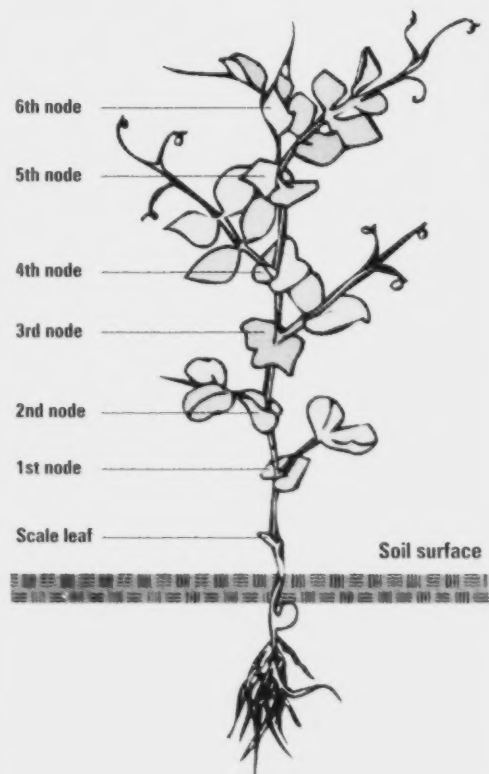
To establish the growth stage of a cereal crop using either of these scales, it is necessary to collect a random sample of plants to determine the level of growth attained by the majority of the plants.

Under good growing conditions, examination of up to 10 random selected plants may be appropriate. Under conditions of uneven germination and low soil moisture, growth stage assessment may require larger samples.

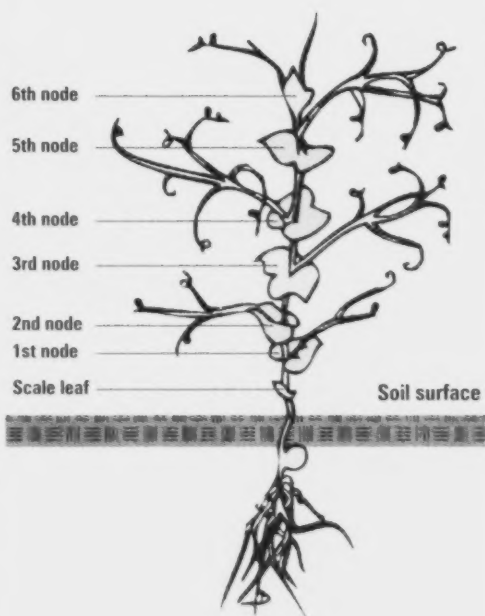
Application of an agrochemical must be timed precisely to maximize the desired effect on the target crop. All agrochemical applications (fungicides, growth regulators, herbicides, or supplemental nutrients) must be based on physiological growth stage of the crop. Applications based on calendar days will be less successful.

Pea Node Leaf Stages

Normal Leaf Type

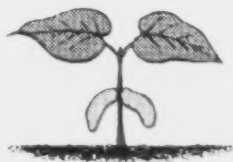


Semi-leafless Type



Bean Leaf Stages

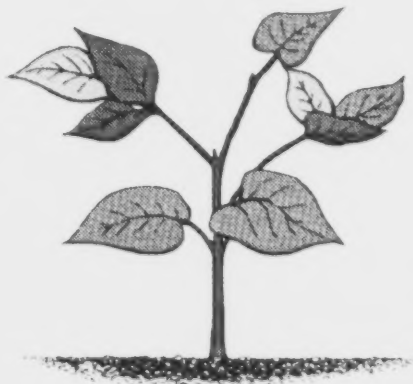
Unifoliate



1st Trifoliate



3rd Trifoliate



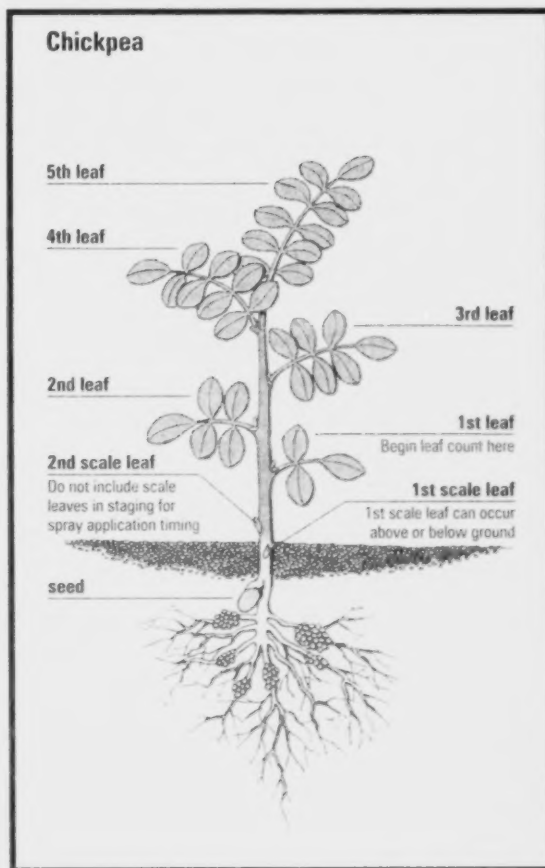
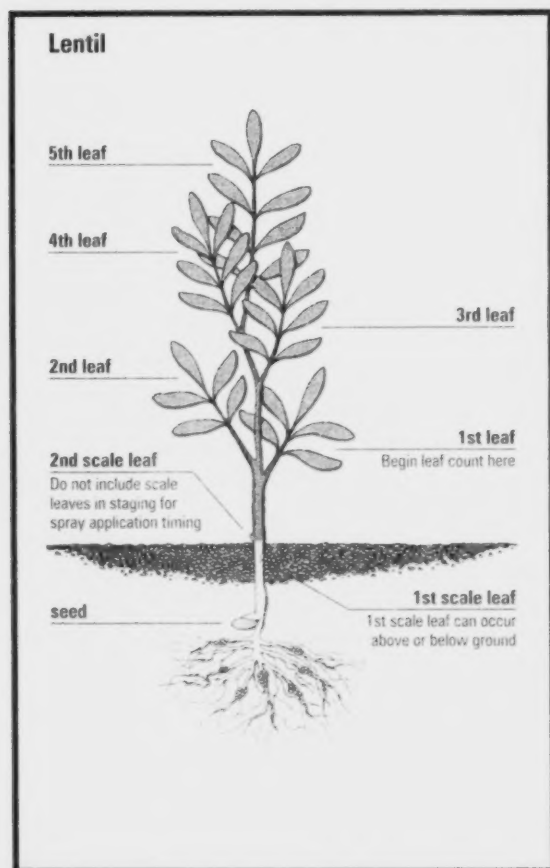
4th Trifoliate



Source: BASF Canada

Acknowledgement: Technical expertise from Dr. Al Slinkard.

Lentil and Chickpea Leaf Stages



Source: BASF Canada

Acknowledgement: Technical expertise from Dr. Al Slinkard.

How to Use This Book

This publication assists in the selection and application of pesticides. The pesticides are grouped into three main sections: herbicides, insecticides and fungicides. Insecticide/fungicide mixes are included in the fungicide section. Each section is indexed separately.

The 2010 Crop Protection book has a different look with some of the herbicide entries this year. We are in the process of changing the format for all pesticide entries to make the information easier to read and to keep the manual compact enough to be useful. Due to timelines, only some of the herbicides are in the new format but we expect them all to be updated for the 2011 book. When completed, the manual will continue to provide necessary information to help

producers select and use appropriate pesticide products for their field crops.

Use the pesticide selector charts at the end of the book and the detailed pesticide descriptions to choose the most appropriate chemicals. To select a suitable pesticide, follow these steps:

- Identify the pest(s).
- Refer to the chart for weed or insect pests, and record the pesticide(s) available.
- Refer to the appropriate pesticide(s) in the text, and select the product best suited to your operation.
- Apply the pesticide strictly according to instructions given on the label attached to the product container.

Chemical Pest Control Summary

Know your problem(s).

- Identify the pest(s).
- Estimate infestation level or probable economic loss to determine if treatment is required.
- Know the crop variety. Some products are restricted to, or excluded from, use on specific crop types or varieties.
- If necessary, note soil type or texture of the area to be treated.

If chemical control is necessary, choose a pesticide based on the following criteria:

- Registered products for the given crop (tank mixes may have separate recommendations).
- Pests controlled by the product.
- Crop and pest stage of growth or development.
- Recommended application time (e.g. spring, summer, fall; time of day).
- Cropping and/or harvest restrictions of product(s) considered.
- Use the least toxic, suitable product.

Read product label directions for:

- Recommended rate(s) for the particular pest, infestation level, crop and field conditions.
- Method of application.
- Any application restrictions during adverse or extreme weather conditions.
- Any other restrictions, cautions or special instructions.

Clean, prepare, maintain application equipment.

- Lubricate and repair equipment to get the best possible performance.
- Clean spray tank of residues to prevent crop damage or problems with equipment.
- Clean, calibrate and, if necessary, replace spray nozzles.
- Check pump and pressure system.

Safely prepare pesticides for application.

- Use protective clothing and recommended safety equipment; the exposure hazard is greatest during mixing.
- Follow the mixing instructions.
- Use the specified amount and quality of water.
- Use recommended rates (tank mix rates may be different from each pesticide used alone).
- If specified, add adjuvants.
- Record the following: rates used, mix order, pesticides and adjuvants used as well as water quality for future reference.

Apply pesticides using:

- Recommended safety precautions and equipment.
- Proper application equipment.
- Recommended rates of pesticides, adjuvants and water.
- Proper time (e.g. growth stage, time of day, season).
- Recommended techniques (e.g. ground speed, pressure, incorporation).
- Record weather conditions at time of application, techniques used, growth stage of crop and pests for future reference.

Sprayer Operations

A summary of sprayer operations is presented in this publication.

Getting the sprayer ready:

- Preliminary maintenance, adjustments and settings must be made according to the operator's manual.
- The entire sprayer system should be cleaned and rinsed.
- Ensure that all nozzles are the same size and spray angle by checking the code number on the nozzle tip.
- Partially fill sprayer tank with clean water.

- Check the pump for adequate output. If the desired spraying pressure can be achieved with the agitator and boom valves open, the pump output is okay.
- Check accuracy of main sprayer gauge by installing a new gauge on the boom end temporarily and compare the pressure readings. The readings should be identical.
- Inspect spray patterns and replace tips that have streaky patterns. Flat fan nozzles should be aligned, so the patterns do not interfere with each other.

Sample Nozzle Chart

Nozzle number	Pressure kPa	Litres per minute	Litres per acre (50 cm spacing)			
			6 km/h	8 km/h	9 km/h	10 km/h
11001	275	0.38	30	22	20	18
110015	275	0.57	45	34	30	27
11002*	275	0.75	60	45	40	36

* Standard tips for 40 L/ac at 275 kPa and 9 km/h. For nozzles not included, refer to manufacturer's data.

Note: If spray charts are not available for your nozzles, the following formula may be used to establish the ground speed required to apply the desired litres per acre.

Formula:

Average nozzle output (L/min) x 240 = km/h
Litres per acre x nozzle spacing (m)*

Example:

0.75 L/min x 240 = 180 = 9 km/h
40 L/ac x 0.5 m 20

* Standard nozzle spacing is 0.5 m.

Nozzle tip calibration

The output of individual nozzles must be within 5 per cent of the average nozzle output to provide an even volume over the width of the spray swath. Nozzles with outputs either above or below this value must be replaced.

- With the sprayer operating at the recommended spraying pressure (275 kPa), collect, measure and record the output from each nozzle on the boom for one minute. Note: if nozzle strainers are equipped with ball-check valves, increase pressure by 35 kPa.
- Calculate the average output.
- Replace nozzles with output 5 per cent greater than average. Clean and recheck nozzles with output 5 per cent less than average.

Ground speed determination

Actual ground speed can be confirmed by noting the time it takes to travel a measured distance. The following ground speed chart is based on the time required to travel 800 metres.

Speed (km/h)	Travel time for 800 m (min:sec)
7	6:48
8	6:00
9	5:20
10	4:48
11	4:22
12	4:00

Sprayer Calibration – Example L/Acre

Step 1: Determine the number of acres to spray using your field records.

Example: 30 acres

Step 2: Know the sprayer tank capacity, which is marked on sprayer tank.

Example: 2,000 litres

Step 3: Determine spray volume needed per acre, which can be obtained from the pesticide label or this publication.

Example: 40 litres per acre recommended

Step 4: Select nozzles for 40 litres per acre from the manufacturer's chart or the sample nozzle chart in this publication.

Example: Nozzle No. 11002 at 275 kPa and 9 km/h = 40 L/acre

Step 5: Check nozzle output. See nozzle tip calibration.

Example: Nozzle flow between 0.71 to 0.79 litres per minute per nozzle is okay

Step 6: Calculate total spray solution needed by multiplying number of acres x litres per acre.

Example: 30 acres x 40 litres per acre = 1,200 litres

Step 7: Calculate the total amount of pesticide needed from the pesticide label or this publication (multiply litres of pesticide per acre x number of acres to spray).

Example: 0.60 L/acre x 30 acres = 18 L of pesticide and 1,182 L of water in sprayer tank

Step 8: Set sprayer to travel at desired speed. See Step 4 (example) and nozzle chart.

Example: Required speed = 9 km/h (36 seconds to travel

Standard Benchmarks

Application volume: 40 litres per acre (L/ac) = 100 litres per hectare (L/ha) = 8.8 Imperial gallons per acre

Spraying pressure: 275 kilopascals (kPa) = 40 pounds per square inch (psi)

Speed for spraying: 9 kilometres per hour (km/h) = 5.4 miles per hour (mph)

Nozzle spacing on spray boom: 0.5 m = 20 inches (in.)

Height above target for 80° and 110°

Nozzle tips: 45 centimetres (cm) = 18 inches (in.)

Nozzle tips: 8002 or 11002

Note: A standard nozzle puts out 0.75 litres per minute at 275 kPa. At 9 km/h, these nozzles apply 40 L/ac of spray.

Metric equivalents

1 acre = 0.405 hectare

2.471 acre = 1 hectare

6.9 kPa = 1 psi

1.6 km/h = 1 mph

2.54 cm = 1 in

1 litre/ac = 2.5 litre/ha

Calibrating Small Sprayers

The spray volume that a backpack or hand-held sprayer will apply per acre can be determined by field testing the sprayer on a portion of an acre. The size of the test area commonly used is 1/100 of an acre. It is important that the test area surface is similar to the surface to be sprayed, so the walking speed will remain the same.

Step 1: Establish a test run distance to spray 1/100 acre (40.5 m₂) according to the swath width of the sprayer.

Swath width	Test run length
0.5 metres	81.0 metres
1.0 metres	40.5 metres
1.5 metres	27.0 metres
2.0 metres	20.2 metres

Step 2: At a comfortable walking speed, spray the test area and measure the volume of water used (repeat 2 or 3 times to obtain an average). This is the amount applied to 1/100 acre.

Example: 2 litres

Step 3: Multiply the figure arrived at in Step 2 by 100 to get the spray volume per acre.

Example: 2 L x 100 = 200 L/ac

Step 4: Determine the amount of pesticide to add per tank load. Divide the volume applied per acre by tank capacity to determine the number of fills required to spray an acre.

Example: 200 L/ac ÷ 20 L/tank = 10 fills

Divide the chemical rate per acre by the number of tank loads required to spray an acre to determine the amount of product to add per tank load.

Example: 1 L/ac ÷ 10 fills = 0.1 L/tank

Preparation and Application of Pesticides

Mixing Instructions

"a"

1. Fill clean tank ¼ to ½ full with clean water.
2. Turn on full agitation.
3. Add the proper amount of herbicide to the water in the spray tank with the agitator running. Maintain full agitation until completely dissolved and product is fully dispersed. Continuous agitation is required to keep the product in suspension.
4. After herbicide has been well mixed and is in suspension, add a recommended non-ionic surfactant.
5. Add the remainder of the water.

On repeat tank loads, ensure that the amount of spray solution left in the tank from the previous load is less than 10% of the volume to be mixed.

"b"

1. Fill tank ½ full of water.
2. Start sprayer agitation.

3. Add Group 2 herbicide and agitate vigorously, if a granule, agitate until dissolved.
4. Add tank mix partner herbicide and continue to agitate.
5. Add adjuvant if required and continue to agitate.
6. Add antifoaming agent if required and continue agitation.
7. Complete filling of the tank with the balance of the water.

"c"

1. Clean spray tank and ½ fill with clean water. Start agitation or bypass system.
2. Add broadleaf herbicide to the tank first prior to adding grassy herbicide and agitate for 2 - 3 minutes.
3. Add correct amount of grassy herbicide.
4. Agitate for 2 - 3 minutes.
5. Add correct amount of adjuvant.

6. Agitate for 1 - 2 minutes before adding remainder of water.
7. After any break in spraying operations, agitate thoroughly before spraying again.
8. Use the spray suspension as soon as it is prepared.
9. If an oil film starts to build up in the tank, drain tank and then clean with a detergent.

"d"

1. Ensure the spray tank is thoroughly clean.
2. Fill the tank half full with clean water and start agitation or bypass system.
3. If a broadleaf herbicide is to be used with Fusion tank mix, add it first and agitate.
4. Slowly add the correct amount of **Component #1** to the spray tank. Agitate thoroughly until **Component #1** is mixed completely.
5. Add the correct amount of **Component #2** and continue agitation.
6. Triple rinse the emptied containers into the spray tank.
7. Add the remaining amount of water while agitation continues. Spray out immediately. Spray mixture should not be left in tank overnight.
8. Thoroughly clean the spray tank after using Fusion tank mix and before using any other pesticide.

"e"

1. Always start with a clean and empty sprayer tank.
2. Fill the tank 1/3 to 1/2 full of clean water.
3. With the agitator running, add the required amount of Express SG herbicide.
4. When Express SG herbicide has been thoroughly dissolved, add the required amount of the appropriate tank mix partner.
5. Add the glyphosate to the tank. If the tank mix partner is an emulsifiable concentrate (EC), reduce agitation to avoid inducing an invert emulsion. Once dissolved, Express SG will remain in solution.
6. Add the rest of the water.
7. If required for tank mixture, add surfactant.
8. Refer to the label for specific tank mixing order and directions.
9. For repeat tank loads, reduce the material remaining in the tank to 10% of the original volume or less before proceeding with Step 1 because remaining chemicals may prevent Express SG from completely dissolving. If it is

not possible, pre-slurry Express SG herbicide in a small amount (5 - 10 L) of water before adding to the tank.

10. If an anti-foaming agent is required, add last.

Proper Mixing of Pesticides

1. Fill the sprayer with half the required amount of clean water.
2. Shake the closed pesticide container vigorously.
3. Slowly add pesticide to sprayer with agitator operating.
4. Add the remaining amount of water and spray at once.
5. If tank mixing more than one pesticide, add pesticides to the tank in the order recommended on the label.
6. Triple rinse or pressure rinse empty containers and add rinsate to the tank.
7. Always agitate vigorously if sprayer has been standing for a time after mixing.

Adjuvants (surfactants, wetting agents, spreaders, etc.)

Adjuvants are added to a pesticide to enhance application and/or performance. The most common adjuvants used in pesticides are surfactants. If adjuvants are required, use only those products named and recommended on the label. Failure to do so could result in:

- crop injury
- reduced pest control
- invalidation of pesticide warranty

Surfactants facilitate and enhance the emulsifying, dispersing, wetting, spreading, sticking, penetrating or other surface-modifying properties of liquids to bring about enhanced pesticidal action. Because these chemicals produce physical changes at the surface of liquids, surfactants are often referred to as surface-active agents.

Surfactants are generally classified into two major groups based on how they react in water: ionic or non-ionic. Ionic surfactants break down when mixed in water, into two entities – a positively charged ion (cation) and negatively charged ion (anion). An example is ammonium sulphate ($2 \text{NH}_4^+ + \text{SO}_4^{2-}$).

Non-ionic surfactants do not break down in water. Consequently, they are unaffected by hard water, can be used in strong acid solutions and are more soluble in cold water than in hot water. Some of the commonly recommended non-ionic surfactants for herbicide mixtures are Agral 90, LJ 700, Ag-Surf, Companion, Citowett Plus, Enhance, Super Spreader, Tween 20.

Tank Mixtures

Tank mixtures are two or more separate pesticides mixed in the sprayer tank, as opposed to a mixture formulated by the manufacturer. For example, wild oat herbicides are frequently mixed with a broadleaf herbicide to control a wide range of weeds.

Rate to use in preparing a tank mix

Always check the product labels for the recommended tank mix rates. Generally, add the amount you would use if each pesticide was applied separately, but there are exceptions. Generalizations may be dangerous to your wallet and your crop.

Preparing a tank mix

To avoid physical incompatibilities, go through the following steps:

- add half the required amount of water and mix with one pesticide
- agitate
- with agitator running, add the other pesticide. Add pesticides to the spray tank in the following order to reduce the possibility of formation of precipitates or gums that may clog nozzles and filters:
 - soluble powders
 - wettable powders and flowable liquids
 - solutions (amines and salts)
 - emulsifiable concentrates (esters)
 - additives (surfactants)

For specific mixing instructions, always check the product labels as there may be exceptions to these guidelines.

Avoid tank mix problems

Check the labels for recommended crops, pests and rates for tank mixes as they may be restricted compared to the recommendations for each individual product. For example, either Poast or MCPA Amine

alone can be used on several crops. A Poast + MCPA Amine tank mix can only be used on flax.

Crop injury, reduced pest control or physical incompatibilities may be the result of using tank mixes improperly. When herbicides for grassy weed control are mixed with herbicides for broadleaf weed control, a partial loss (sometimes total loss) of activity on grassy weed control is quite common. When reduced weed control or crop injury is likely to occur, the advantages of tank mixing are soon lost.

- Tank mix properties are not necessarily the same as those of the individual pesticides applied separately.
- Use registered tank mixes only.
- Check the labels for recommended crops, pests, rates and adjuvants for tank mixing.
- Follow label directions for preparing the mix.
- Use only on crops or varieties registered for the particular tank mix.
- Apply at the recommended stage of growth or development of crop and pest(s).

What to Do if Results Are Unsatisfactory

- Ensure the choice of pesticide(s) was suitable. Are the treated crops and pests listed on the product label(s)?
- Compare your method of pesticide preparation to the product label(s) instructions.
- Check for equipment malfunction – e.g. plugged screens, nozzles worn or mixed type or size.
- Compare your application techniques with those given on label(s) – e.g. stage of growth or development of crop and pest(s), ground speed, pressure and incorporation.
- Consider weather conditions at application time – several labels include cautions against application during weather extremes – e.g. cold, heat, drought.
- Consider time since application. Some results are not apparent for several days. Look for early symptoms of the chemical taking effect.
- If results are unsatisfactory, seek technical help. Gather all relevant data, particularly evidence such as photos or specimens. Record wind, rainfall, soil moisture condition, crop variety, fertility, quantity of material used, acres treated and temperature at time of spraying.

- Document everything in writing. If crop damage is involved, submit a specimen for diagnosis. Disease or insect damage can resemble herbicide injury.

Responding to a Pesticide Related Concern

The *Environmental Protection and Enhancement Act* prohibits any person from causing adverse effects when using pesticides. Farmers who witness or suspect a pesticide drift or runoff that could affect their family, pets or livestock or cause an adverse effect to their shelterbelt, crop or their land should take the following actions to protect themselves and assist in an investigation that may result at a later date:

- Immediately request family members to go into the home to protect themselves from exposure. Close all windows and air conditioning units in the home. If they have felt spray settle on them, they should immediately remove clothing and wash exposed skin. If any physical symptoms develop, then they should seek medical assistance or call the Poison Centre at 1-800-332-1414.
- Pets should be removed from the immediate spray area or area where drift has occurred.
- If livestock are at risk, the applicator should be asked to stop the application until the livestock can be removed or conditions change so the wind is blowing away from the livestock.
- If drift has occurred in the farmyard, then outdoor furniture and play equipment should be washed before use and garden produce, berry and fruit trees should not be harvested or consumed but should be monitored for unusual growth or discoloration. If the produce shows signs of damage, it should be destroyed. If berries or fruit trees show signs of damage, the berries or fruit should not be eaten. If no signs of damage occur after one to two weeks (depending on the pesticide), then all produce, berries and fruit should be washed thoroughly.
- Record as much detail of the application equipment (colour and type of spray equipment; make, model, licence plate number, company information off nurse trucks; colour, distinguishing features, call numbers on the aircraft). If possible, take pictures.
- Write down everything regarding what was witnessed including date and time of occurrence, weather conditions at the time, crop being sprayed, pesticide being applied (from pesticide containers at the site), extent of drift witnessed, description of person helping or doing the application, other witnesses.
- Attempt to contact the adjacent landowner and indicate your concerns.
- Contact the Alberta Environmental Response Centre at 1-800-222-6514 **promptly** for information and assistance in investigating the concern. Some pesticides degrade quickly, so prompt investigative action is required to proceed with enforcement action.

Sprayer Clean-out

Modern pesticides can affect susceptible crops at very low concentrations. Proper sprayer cleaning is a critical component for the maintenance of the sprayer, reducing water contamination risks and eliminating crop injury from equipment contamination.

Herbicide residue adheres to tank walls and crevices and may be brought into solution by a subsequent herbicide or a particularly effective spray adjuvant acting as a solvent. Plastic or polyethylene tanks and hoses tend to require more extensive cleaning than stainless steel tanks. Post-emergent application sprayed directly on crop foliage will have a greater potential for crop injury than soil-applied herbicide. Crop injury from sprayer contamination can occur even several months after using the sprayer without proper cleanup, and injury can occur even following several subsequent applications.

Water is needed for dilution. The more often a sprayer is rinsed out, the greater the dilution of chemical left. You have a greater dilution by repeatedly rinsing the tank with small quantities of water rather than one rinse with a large volume of water. Water is adequate to flush and rinse the sprayer with some herbicides, but others need additional cleaning agents. The additional cleaning agents needed for cleaning will depend on the herbicides used. There are common household chemicals that can be used, but most producers use commercial sprayer cleaning products. Sprayer cleaning agents can have several functions including dilution, solubilization, and/or de-activation.

Cleaning agents can increase the solubility of a herbicide. Ammonium increases the pH of the solution, which increases the solubility of sulfonylurea herbicides. The agent may not help break down the herbicide, but it does help strip the herbicide off the tank surfaces and get it into solution. Chlorine bleach

enhances the decomposition of sulfonyleurea and many other herbicides, but it is **less** effective than ammonia at dissolving and removing sulfonyleurea from the tank.

Chlorine bleach should never be added to ammonium or liquid fertilizer containing ammonium as, when mixed together, the two materials react to form toxic chlorine gas, causing eye, nose, throat and lung irritation.

Oil-based solvents such as fuel oil are most effective for removing oil-soluble herbicides, such as esters and emulsifiable concentrates. The oil solvent should be followed with a detergent rinse to remove the oil residue.

Detergents remove many materials including water and oil-soluble herbicides. Commercially available sprayer cleaning agents normally perform better than household detergents for cleaning sprayers.

The best source of information on cleaning agents and procedures is the herbicide label for the product used.

Activated charcoal de-activates organic herbicides.

A 3 per cent suspension of activated charcoal in water can be added and circulated throughout the sprayer system to tie up and de-activate any pesticide residue. The charcoal must be removed by rinsing to prevent the de-activation of a portion of the pesticide used in the sprayer.

Sprayers should be cleaned as soon as possible after use. Dried pesticide residues are much more difficult to remove than pesticide in solution. Reduce waste and excess application by only mixing the amount of pesticide required, and apply the entire amount on the field according to the label recommendations. Thoroughly rinse the sprayer tank with water, circulate the water through the sprayer system and, if possible, apply the rinsate to the treated field.

Do not clean sprayers near creeks, dugouts, sloughs, wells or any other water sources. Ensure that wash water does not come into contact with any desirable vegetation or its roots. Make sure discharged wash water (especially from insecticides) will not be accessible to children or animals. Do not contaminate any watercourse or water body with wash water. Note: Pesticides may have specific recommendations for sprayer clean-out. Refer to product labels on the container for recommendations.

There are three main methods for sprayer tank cleanup depending on the pesticide used.

Method A

Drain contents of tank followed by 1 or 2 water rinses, 2 ammonia rinses (**NOT containing chlorine**) followed by 2 water rinses (one just prior to next sprayer event). Products that can use this cleanup method include: 2,4-D, Accent, Ally, Atrazine, Avadex, dicamba, Dichlorprop + 2,4-D, DyVel, Escort, Everest, Express Pack, FlaxMax, Fusion, Harmony Total, MCPA, Muster, Muster Gold, Poast Ultra, Prism, Pursuit Ultra, Refine, Refine M, Rustler, Sundance, Tordon 22K, Unity.

Method B

Drain contents of tank followed by 2 water rinses, 2 detergent rinses, then 2 more water rinses. Products you use this method for include Axial, Liquid Achieve SC*, Achieve Liquid Gold*, Basagran, Bromoxynil + MCPA, clethodim, Gramoxone*, Liberty, Puma120 Super, Reglone Dessicant*, Reward*, Sencor, trifluralin products, Venture L*.

* Manufacturers of these products recommend adding a non-ionic surfactant such as All Clear, Agral 90 or Agsurf at 0.6 L per 100 L water.

Method C

Drain contents of tank followed by several repetitions of the water rinse with nozzles and screens removed and checked for debris. Products that can use this method are Amitrol 240, Assure II, Attain, Dual II Magnum, Eclipse, glyphosate products, Horizon, Horizon BTM, Lontrel, Odyssey, Prestige, Solo.

The above directions are general processes based on similarities of tank cleaning recommendations between products in each of the herbicide groups. Always follow the specific instructions on the product label. Follow these guidelines if label recommendations don't cover tank cleanup.

Products that are water based can usually be cleaned from the spray tank using Method C. Products formulated as an EC (emulsifiable concentrate), SC (soluble concentrate), or F (flowable) or use a petroleum based adjuvant should at least use Method B. The detergent breaks down the oil that may be sticking to the sides of the tank. Most Group 2 herbicides have tank cleanout recommendations, but those that don't should use Method A for tank cleanout.

If there is a tank mix of different pesticides, use the appropriate combination of methods to clean the tank.

Group 2 herbicides will occasionally get trapped on the tank wall by petroleum-based formulations or adjuvants, resulting in tank residues. Add detergent at 0.25 L/100 L to the ammonia rinse to prevent this situation from happening. The detergent breaks down the petroleum coating to allow the ammonia access to the Group 2 product.

Pesticide Applicator Certificate

Anyone applying pesticides (herbicides, insecticides, fungicides or rodenticides) on property not owned, rented or leased by them or in exchange for a fee must hold a Pesticide Applicator Certificate (issued by Lakeland College) and a Pesticide Service Registration (issued by Alberta Environment). If someone is offering to spray your property, ask to see a Pesticide Service Registration and a Pesticide Applicator Certificate (all applicators are issued wallet-sized identification cards).

For questions pertaining to pesticide applicator certification, please call Lakeland College at 1-866-853-8646. For questions pertaining to service registrations, contact the nearest regional office of Alberta Environment.

Please remember that a certificate is not a guarantee of performance. A certificate only certifies that the certificate holder has met a minimum standard of knowledge; it cannot assess an applicator's integrity or the honesty of his business practices. If you are uncertain about the reliability of a particular applicator, ask for references.

Farmer Certification Requirements

Pesticide manufacturers and the federal Pest Management Regulatory Agency (PMRA), in consultation with provincial agriculture and environment departments across Canada, have agreed that some pesticides have higher toxicity and/or greater potential to adversely affect health or the environment and require producers to obtain further knowledge to purchase and use them. This means, producers must take a course and pass an exam verifying that they have the knowledge to safely and effectively manage and apply these pesticides when applying them on their own property. Currently, pesticides containing the active ingredient aluminum

phosphide require mandatory certification for producers to purchase and use.

Producers are encouraged to consider obtaining Farmer Pesticide Certification. The course contains detailed grain fumigation and rodent management information that can assist in preventing outbreaks and managing them more effectively when they occur. The Environmental Farm Plan further encourages producers to learn more information about safe and effective handling, use, application, storage, transportation and disposal of pesticides. The Farmer Pesticide Certificate course has been developed for producers and meets the Standard for Pesticide Education, Training and Certification in Canada. Not only does it provide producers with essential information, it also provides evidence to the public, who consume their product, that producers hold current knowledge required to safely and effectively apply pesticides.

Producers can obtain the Farmer Pesticide Certificate course material from several sources:

- online at: [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/prm12233](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/prm12233)

The Ag-Info Centre can also provide producers with information regarding in-class sessions that can be taken throughout Alberta and how and where producers can write the certification examination.

Note: The Farmer Pesticide Certificate does not qualify a producer to apply pesticides for other farmers or for a fee. Producers wanting to provide any pesticide application service off their own property must obtain a Pesticide Applicator Certificate. The training materials and examinations for this certificate are offered through Lakeland College at 1-866-853-8646.

Pesticide User Responsibility

Pesticide drift

Pesticide drift is a concern for ground as well as aerial application. Landowners are responsible for ensuring that any pesticide applications conducted on their property are conducted in a safe, responsible manner.

- The choice of chemical should be made with adjacent land uses in mind. If neighbours have livestock, bees, shelterbelts and gardens that may be affected by off-target drift, they should be notified prior to application. Perhaps a different chemical, formulation or application method will

provide the same control and greater compatibility with neighbouring land uses.

- All sprayers (ground or air) should be calibrated prior to use, taking into consideration nozzle type, nozzle pressure and boom height. Calibration will assure better performance as well as reducing the risk of chemical drift. If you are hiring a custom applicator (ground or air), be sure to ask when the equipment was last calibrated, and be sure to check during the application to see whether any visible drift is occurring.
- Some adjuvants or stickers can help reduce spray drift.
- Buffer strips should be left when applying pesticides next to sensitive crops and farmsteads. The size of these strips may be specified on the pesticide label, but if not, then the size will depend on the chemical used, the application method and the degree of risk from escaping drift. Pesticide applications conducted near rivers, creeks, lakes, irrigation canals or other open bodies of water require extra care and caution to ensure water users will not be affected by the proposed pesticide application and that the application is conducted in a manner that will not adversely affect aquatic or riparian habitats. Ideally, natural vegetation should be left along natural water bodies to ensure bank stability and to provide a natural buffer and filter for agricultural chemicals. A Special Use Approval must be obtained from Alberta Environment to perform pesticide applications within 30 metres of an open body of water when the adjacent land is unimproved rangeland, pasture or woodlot. Certified applicators applying pesticides within 30 metres of an open body of water do not require a Special Use Approval as long as the pesticide they are using is identified in the Environmental Code of Practice for pesticides and they are following the conditions of application specified in the code.
- Pesticides should not be sprayed when winds are excessive (generally winds over 16 km/hr are considered a drift hazard). Pesticides should only be sprayed when winds are blowing away from farmsteads, sensitive crops or water bodies. Conditions of "dead-calm" or temperature inversions or gusting should also be avoided to prevent vapour clouds. A suitable drift retardant additive to the spray tank may help reduce the potential drift hazard associated with the spraying of pesticides.
- Appropriate nozzles that produce a good droplet size range are an important drift management tool.
- Always assess the risk to adjacent landowners, and never push weather conditions to meet deadlines. If completing an application as planned may mean damaging your neighbour's property, postpone the application or modify it to prevent off-target damage. Landowners can be held liable for pesticide drift even if a custom applicator was hired to perform the application. When you hire a custom applicator, it is important that you hire a company that is registered, operates with certified applicators and has the knowledge, equipment, experience and desire to perform an application properly. Custom applicators must be aware of neighbouring residences and sensitive crops, (including gardens, livestock, bees, shelterbelts and gardens) that could present problems if drift should occur.
- All pesticide users, commercial pesticide applicators and farmers are legally responsible for safe pesticide use. Farmers who cause damage from their pesticide application activities or who counsel a commercial pesticide service to conduct either an illegal pesticide application or an application under questionable circumstances (e.g. extremely windy conditions) that results in damage, can be held liable for compensation and face potential prosecution. **Farmers are cautioned** not to counsel commercial applicators to apply pesticides not registered for the use intended or to direct applications to occur under known circumstances that could cause damage (such as under windy conditions). Results of such actions could cost you time and money by having to appear in court to answer to charges or through the subsequent remediation of damaged crops, shelterbelts, gardens, etc.

Notification of neighbours before applying pesticides

Notifying your neighbours before you or a custom application service begins spraying for you is **strongly recommended and good practice**, particularly if your fields border your neighbours farmstead or other sensitive areas (e.g. where beehives, gardens or shelterbelts may be located). Many potentially harmful situations may be avoided if you talk to your neighbour and advise what and when you anticipate spraying. Let them know whether you will be spraying by ground or by air (noise from low flying aircraft has been known to cause panic in livestock), and ask if your neighbour is planning any events (e.g. family reunions/picnics) where larger numbers of people may be gathered and could

potentially be exposed to pesticides from your application. By notifying your neighbours, you are not seeking their consent, but rather letting them know you are concerned about them and their property and want them to be able to take whatever action they believe is necessary before spraying to reduce the potential exposure to the pesticide.

Disposal of pesticide treated seed

Seed treated with a fungicide, fungicide mixture or fungicide/insecticide combination can be very toxic and should be treated with respect. A blue or red colouration on seed indicates it is pesticide-treated. Extra care must be taken during the transport and disposal of pesticide treated seed to prevent domestic animals, birds and other wildlife from consuming the treated seed.

Treated seed is very hazardous to birds. Any left lying on the ground can be eaten by birds, killing them. Be sure treated seed is properly seeded and never leave surplus seed unburied. Spills of treated seed, such as from trucks lurching, can be enough to kill deer or cattle. Treated seed blowing off along the road can kill many birds.

Cover granular pesticides with soil immediately after application to prevent birds and other wildlife from being able to consume them.

Spillage

Move treated seed, particularly insecticide treated seed, in labelled, marked bags. Open container transport is not recommended. Bags should be checked for damage, and containers should be sealed or lined with plastic or other suitable material. Truckloads of seed should be tarped down securely to avoid any possible highway spillage. All treated seed and seed treatment residue should be placed into the seeder at planting time – never dumped in a field.

Disposal

Normally, treated seed is planted within one or two years of treatment. If there is treated seed, either bagged or loose that is either considered too old or too low in germination, then consider its disposal. Such treated seed should be mixed with new seed and planted at higher rates or seeded by itself. For example "old canola seed" can be mixed and sown with new canola seed or overseed alone along field margins or low areas. If disposal is necessary, check with your local landfill authority before disposing in a sanitary landfill. Ensure that the treated seed is

covered immediately after dumping.

Pesticide disposal

Unwanted or out-of-date pesticides should be disposed of very safely and responsibly. Pesticides are hazardous wastes and cannot be disposed of in sanitary landfills or by burning. If you will not be able to use pesticide supplies, check to see whether a neighbour may have some use for them. Pesticides that have no further use must be disposed of through a qualified (approved) hazardous waste disposal firm. Names of companies that are licenced to handle hazardous waste can be obtained by contacting the Alberta Recycle Information Line toll-free at 1-800-463-6326 or in Edmonton at (780) 427-6982.

Water protection

The preservation of surface water is critical to our sustained quality of life and agricultural production. Surface water throughout Alberta has been monitored for a number of years. Monitoring data collected over a seven-year period indicated that 98 per cent of over 3,000 samples contained at least one pesticide active ingredient. The majority of the pesticides found in surface water are shown to have originated from either agricultural or urban areas. Farmers must take the necessary steps to prevent pesticides from continuing to enter surface water. Pesticides can be carried to a water body in three ways:

- spray drift from application equipment
- water runoff from farmland
- attached to soil and carried by wind

The greatest protection of surface water occurs by maintaining vegetation (trees, shrubs and grasses) surrounding small streams, rivers and lakes. This riparian vegetation acts as a filter to protect surface waters. Where the riparian vegetation no longer exists, grass buffers should be left next to water to help filter the runoff from agricultural land. Additional protective actions can also assist in protecting water:

- Pesticide must **not** be stored or mixed or application equipment cleaned within 30 metres of any water body and water sources including wells and dugouts.
- Pesticides subject to leaching should not be used on coarse-textured soils (i.e. sandy or gravelly) to prevent groundwater contamination.
- Never store pesticides in well houses.
- Haul water to your sprayer and fill it in the field rather than taking the sprayer near the water source.

- Do not leave sprayers unattended while filling.
- Empty pesticide containers should never be left near a water body.
- Where possible, spray when wind is blowing away from the water body.
- Have an emergency pesticide spill kit available when mixing pesticides.

Pesticide container disposal

Triple rinsing or pressure rinsing of pesticide containers is the recommended method of cleaning pesticide containers prior to disposal. Triple rinsing renders used pesticide containers (metal, plastic, glass) more than 99 per cent free (less than 1 ppm) of residues in most cases. There are a number of systems for pressure rinsing. The simpler style consists of a hollow spike connected to a water line, which injects water under pressure into the jug, which is then drained into the spray tank. A newer style consists of a small hopper mounted right on the sprayer with a sharp metal jug opener and a pressure rinse nozzle in the bottom of the hopper. The full jug is inserted on the jug opener, which drains the chemical into the tank. Wash water is injected under pressure to rinse the container. The chemical and rinse solution is then pumped into the spray tank by direct hose connections.

Unrinsed containers have the potential to contaminate soil, ground water and surface water, and can be toxic to fish and wildlife. Unrinsed containers impede the processing and recycling of empty pesticide containers, as containers have to be emptied, and workers are exposed to the residue. Residues can be transported to the atmosphere during storage, processing, shipping and energy recovery, or they can contaminate end products from plastic recycling processes. In addition, it is estimated that 6 to 7 per cent of product can be left in unrinsed containers. This amount of material can treat 1/2 to 1 acre of land and can result in several dollars of savings.

It is the responsibility of the farming community to ensure that their empty pesticide containers are directed to a designated collection site, whether it is a municipal site or back to the point of purchase (depending on the product and size of container). Please determine the correct disposal site at the time of purchase.

Containers disposed of at a container collection site are to be clean (triple rinsed or pressured rinsed) and well drained (dry). Paper bags and cardboard containers that contained pesticides should be thoroughly emptied and disposed of at a sanitary landfill. **Do not burn paper bags or cardboard containers.**

Under the *Alberta Environmental Protection and Enhancement Act*, non-refillable plastic or metal pesticide containers (restricted, agricultural and industrial products) must be disposed of at a pesticide container collection site.

Outer packaging (cardboard box) and paper booklets (affixed to plastic containers) can be disposed of in a regular landfill, or they can be recycled if non-contaminated. The presence of the paper attached to the containers that are to be recycled impairs the quality of the plastic, which will be used for other end products. Some pesticide container sites have bins or separate areas for collecting outer packaging and label materials.

Steps to follow for manual triple rinsing

(without using a pressure rinse system):

- Empty contents of the container into the spray tank and drain in a vertical position for 30 seconds.
- Add water to container to about 1/5 full.
- Shake the container thoroughly and empty into the spray tank, and drain for 30 seconds.
- Repeat the procedure two more times; it should only take about 5 minutes in total.
- Triple rinsed containers should be punctured or broken to render them non-reusable. Punctured containers also identify themselves as being triple rinsed. **Note:** Do not puncture unrinsed containers – pesticide from unrinsed containers is concentrated material, and puncturing unrinsed containers will cause them to leak and create exposure of the concentrated material to the environment and to persons handling the containers.
- Dispose of all plastic and metal containers at a pesticide container collection site (see list).

Pesticide spill cleanup

The best way to minimize the effects of a pesticide spill is to have an emergency response plan prepared and in place that includes a copy of the Material Safety Data Sheet (MSDS) and a procedure to handle all types of pesticide emergency. In addition, a spill cleanup kit should be prepared and be available near the pesticide storage site and at the mixing and loading site. A spill cleanup kit should include the following:

- personal protective equipment (see the Protective Clothing and Equipment section)
- absorbent material such as activated charcoal, vermiculite, dry coarse clay, kitty litter or commercial absorbent
- neutralizing material as indicated on the MSDS
- long-handled broom for dry formulations
- shovel for liquid formulations
- waste-receiving container with a lid
- blank labels to identify contents of waste container

In the event of a pesticide spill, follow the steps listed below:

- Isolate affected area.
- Put on protective clothing and equipment.
- Ventilate the area (if indoors). For outdoor spills, work from the upwind side of the spill.
- If possible, stop the containers from further leaking.
- Contain the spread of the spill using soil, sand bags, vermiculite, kitty litter, etc. to provide a barrier to the spread of the spill. Prevent pesticide entry into sewers or water supply.
- Report the spill immediately (if into or threatening a watercourse or if the pesticide is or will cause an adverse effect off your property).
- Clean up the spilled pesticide. Absorb spill on paper, sand, dirt or other inert material (e.g. kitty litter).

- Decontaminate the spill area by washing the site with detergent or other cleaning products such as ammonia. Check the product label MSDS (material safety data sheets) or contact the manufacturer for advice on cleanup procedures (most products have a 1-800 customer service number on the label) and disposal. If the spill is large, evacuate the area and notify safety personnel.

Emergencies or spills must be reported to the 24 hour Alberta Environmental Response Centre: 1-800-222-6514.



The CleanFarms initiative offers a free empty pesticide container recycling program. The program requires pesticide containers to be pressure rinsed or triple rinsed; paper booklets must be removed, and the clean, empty containers can be returned to a pesticide container site (see following pages). For more information, contact your local collection site or visit www.croplife.ca

Pesticide Container Site Locations

Municipality	Site	Legal land location	Contact
Acadia, MD of	Acadia Valley Landfill	NW7-25-1-W4	Rick Niwa (403) 972-3808
Athabasca, County of	Colinton Waste Transfer Station	NE7-65-22-W4	Ron Jackson (780) 675-2273
Barrhead, County of	Barrhead Landfill	SW3-60-4-W5	Marilyn Flock (780) 674-3331
Beaver County	Ryley Regional Landfill	NE10-50-17-W4	Aimee Boese (780) 663-3730
Beaver County	Viking Waste Transfer Station	NE31-47-12-W4	Aimee Boese (780) 663-3730
Big Lakes, MD of	High Prairie Regional Landfill	NW9-73-15-W5	Gary Braithwaite (780) 523-5955
Birch Hills County	Wanham Landfill	SW13-78-3-W6	Warren Sekulic (780) 694-3793
Birch Hills County	Tangent Landfill	NE36-78-25-W5	Warren Sekulic (780) 694-3793
Bonnyville, MD of	Bonnyville Seed Cleaning Plant	NW18-61-5-W4	Matt Janz (780) 826-3951
Bonnyville, MD of	Goodridge Landfill	SW4-63-9-W4	Matt Janz (780) 826-3951
Brazeau County	Drayton Valley – Brazeau Reg. Landfill	SE20-49-7-W5	Rick Ennis (780) 542-7777
Calgary, City of	Calgary – Forest Lawn Landfill (includes MD #44)	3801-68 St. S.E. Calgary	Corey Colbran (403) 230-6634
Camrose, County of	Camrose Regional Landfill	NE16-46-20-W4	Paul King (780) 672-4765
Camrose, County of	Ferintosh – West Dried Meat Lake Landfill Authority	SW14-44-21-W4	Paul King (780) 672-4765
Cardston County	Spring Coulee Waste Transfer Station	SW32-4-23-W4	Rod Foggini (403) 653-4977
Clear Hills, MD of	Worsley Landfill	SE25-87-8-W6	Aaron Zylstra (780) 685-3925
Clearwater County	Rocky Mountain House Waste Transfer Station	SE2-39-5-W5	Kim Nielsen (403) 845-4444
Cypress County	Irvine Waste Transfer Station	NE31-11-2-W4	Jason Storch (403) 526-2888
Cypress County	Medicine Hat – Lakeside Milling	NE21-12-6-W4	Jason Storch (403) 526-2888
Cypress County	Schuler Waste Transfer Station	SE20-16-1-W4	Jason Storch (403) 526-2888
Drumheller, Town of	Drumheller Regional Landfill	2490 South Railway Ave	Tammi Nygaard (403) 832-1345
Edmonton, City of	Edmonton – Clover Bar Landfill	SW28-53-23-W4	Rick Lewin (780) 496-5411
Fairview, MD of	Fairview Landfill	SW27-82-3-W6	Fred Sawchuk (780) 835-4903
Flagstaff County	Sedgewick – Flagstaff Reg. Landfill	SW11-45-12-W4	Doug Munroe (780) 384-3950
Foothills, MD of	Okotoks – Foothills Reg. Landfill	SE32-19-29-W4	Ron Stead (403) 652-2341
Forty Mile, County of	Bow Island Landfill	SE23-11-11-W4	Dave Matz (403) 867-3530
Forty Mile, County of	Foremost Waste Transfer Station	NW19-6-11-W4	Dave Matz (403) 867-3530
Grande Prairie, County of	Clairmont Landfill	NW27-72-6-W6	Mary Lupwayi (780) 513-3955
Grande Prairie, County of	West County Regional Landfill	S1/2-22-73-9-W6	Mary Lupwayi (780) 513-3955
Greenview, MD of	Valleyview – MD Yard	NW10-70-22-W5	Susan Kerekanich (780) 524-7601
Kneehill County	Three Hills Waste Transfer Station	SW25-31-24-W4	Bruce Sommerville (403) 443-5541
Lac La Biche County	Lac La Biche Landfill	NW36-66-13-W4	Doug Richardson (780) 623-1747
Lac Ste. Anne County	Gunn – Lac Ste. Anne Reg. Landfill	NE18-55-3-W5	Geoff Thompson (780) 785-3411
Lacombe County	Eckville Waste Transfer Station	NW34-39-3 W5	Dion Burlock (403) 782-6601

Municipality	Site	Legal land location	Contact
Lacombe County	Mirror-Alix Waste Transfer Station	NW24-40-23-W4	Dion Burlock (403) 782-6601
Lacombe County	Prentiss Waste Transfer Station	NW7-40-25-W4	Dion Burlock (403) 782-6601
Lamont County	Lamont Regional Landfill	NW7-56-18-W4	Terry Eleniak (780) 895-2585
Leduc County	Nisku Sewage Transfer Station	SW31-50-24-W4	Garett Broadbent (780) 955-3555
Leduc County	Thorsby - County Yard	SE17-49-1-W5	Garett Broadbent (780) 955-3555
Lesser Slave River, MD of	Flatbush Waste Transfer Station	NW36-65-2-W5	Russ Jassman (780) 681-3929
Lethbridge, County of	Coaldale Waste Transfer Station	SW23-9-20-W4	Don Bodnar (403) 328-5525
Lethbridge, County of	Iron Springs Waste Transfer Station	SW27-11-20-W4	Don Bodnar (403) 328-5525
Lethbridge, County of	Nobleford Waste Transfer Station	SE10-11-23-W4	Don Bodnar (403) 328-5525
Lethbridge, County of	Picture Butte Waste Transfer Station	NW27-10-21-W4	Don Bodnar (403) 328-5525
MacKenzie, MD of	High Level Regional Landfill	SE1-110-20-W5	Grant Smith (780) 927-3717
Minburn, County of	Mannville Landfill	SW16-50-9-W4	Darwin Ullery (780) 632-4033
Minburn, County of	Vegreville Landfill	NW21-52-14-W4	Darwin Ullery (780) 632-4033
Mountain View County	Didsbury - (near airport)	SW5-32-1-W5	Jeff Holmes (403) 335-3311
Newell County of	Newell Regional Landfill	SE34-19-15-W4	Ray Juska (403) 362-9567, 362-2651
Newell, County of	Bassano Waste Transfer Station	NE18-21-18-W4	Ray Juska (403) 362-9567, 362-2651
Northern Lights, MD of	Dixonville - Long Lake Reg. Landfill	NW3-86-24-W5	Terry Schamehorn (780) 836-3348
Northern Sunrise County	Nampa Waste Transfer Station	E19-81-20-W5	Audrey Gall (780) 322-3831
Northern Sunrise County	St. Isidore Landfill	SW2-84-20-W5	Audrey Gall (780) 322-3831
Paintearth, County of	Castor Waste Transfer Station	SW3-38-14-W4	Jeff Cosens (403) 882-3211
Paintearth, County of	Coronation (Paintearth Resource Recovery Centre)	NE34-36-11-W4	Jeff Cosens (403) 882-3211
Parkland County	Stony Plain Landfill	SE35-52-1-W5	Mark Cardinal (780) 968-8467
Parkland County	Tomahawk-County Yard	SW13-51-5-W5	Mark Cardinal (780) 968-8467
Peace, MD of	Griffin Creek Landfill	SW18-81-25-W5	Torsten Gevenich (780) 338-3845
Pincher Creek, MD of	Cowley Regional Landfill	NW8-7-1-W5	Alan Jacklin (403) 627-4151
Pincher Creek, MD of	Pincher Station	SW1-7-30-W4	Alan Jacklin (403) 627-4151
Ponoka County	Bluffton Landfill	NE6-44-2-W5	Shayne Steffen (403) 783-3333
Ponoka County	Ponoka Waste Transfer Station	NE36-42-25-W4	Shayne Steffen (403) 783-3333
Provost, MD of	Provost Regional Landfill	SW3-40-3-W4	Burt Forbes (780) 753-2368
Red Deer County	Kevisville Waste Transfer Station	NE20-35-02-W5	Art Preachuk (403) 350-2163
Red Deer County	Horn Hill Waste Transfer Station	NE33-36-27-W4	Art Preachuk (403) 350-2163
Rocky View, MD of	Didsbury (near airport)	SW5-32-1-W5	Tim Dietzler (403) 230-1401
Saddle Hills County	Blueberry Waste Transfer Station	SE3-80-8-W6	Amy Kaut (780) 864-2004
Smoky Lake County	Smoky Lake Landfill	NW2-60-17-W4	Scott Franchuk (780) 656-3730
Smoky River, MD of	Falher Landfill	NW15-78-21-W5	Norman Boulet (780) 837-2222
Special Area #2	Bindloss Waste Transfer Station	SE24-22-3-W4	George Aaserud (403) 854-5628
Special Area #2	Hanna Waste Transfer Station	NW16-31-14-W4	George Aaserud (403) 854-5628

Municipality	Site	Legal land location	Contact
Special Area #3	Oyen Waste Transfer Station	LSD3-27-27-4-W4	Trent Caskey (403) 664-3618
Special Area #3	Youngstown – Big Country Regional Landfill	SE29-29-9-W4	Trent Caskey (403) 664-3618
Special Area #4	Monitor Waste Transfer Station	NW32-34-4-W4	Ryan Buehler (403) 577-3523
Spirit River, MD of	MD of Spirit River Landfill	SW31-77-5-W6	Vacant (780) 864-3500
St. Paul, County of	Mallaig Waste Transfer Station	NE24-60-10-W4	Dennis Bergheim (780) 645-3301
St. Paul, County of	St. Paul Seed Cleaning Plant	SE16-58-9-W4	Dennis Bergheim (780) 645-3301
Starland County	Rumsey Waste Transfer Station	SW24-33-21-W4	Alan Hampton (403) 772-3793
Starland County	Michichi Waste Transfer Station	NW19-30-18-W4	Alan Hampton (403) 772-3793
Stettler, County of	Stettler Regional Landfill	NW22-40-19-W4	Cara Bomphray (403) 742-4441
Strathcona County	Fort Sask. Recycling Station	11121-88 Ave. Ft. Sask.	David Churchill (780) 417-7130
Sturgeon County	Sturgeon Regional Landfill (Roseridge Waste Mgmt)	SW36-55-25-W4	Susan Berry (780) 939-5678
Taber, MD of	Enchant Waste Transfer Station	NW16-14-18-W4	Jon Hood (403) 223-8735
Taber, MD of	Grassy Lake Waste Transfer Station	NW23-9-13-W4	Jon Hood (403) 223-8735
Taber, MD of	Taber Waste Transfer Station	SE12-10-17-W4	Jon Hood (403) 223-8735
Taber, MD of	Vauxhall Waste Transfer Station	SW12-13-16-W4	Jon Hood (403) 223-8735
Thorhild, County of	Thorhild	NE5-60-21-W4	Harold Hamilton (780) 398-3741
Two Hills, County of	Two Hills Regional Landfill	NE5-55-11-W4	Al Ropchan (780) 657-3358
Two Hills, County of	Willingdon Seed Cleaning Plant	NE1-56-15-W4	Al Ropchan (780) 657-3358
Vermilion River, County of	Marwayne Waste Transfer Station	SE34-52-3-W4	Howie Bjorge (780) 846-2244
Vermilion River, County of	Paradise Valley Waste Transfer Station	SW7-47-2-W4	Howie Bjorge (780) 846-2244
Vermilion River, County of	Vermilion Transfer Station	SW5-51-6-W4	Howie Bjorge (780) 846-2244
Vulcan County	Mossleigh Transfer Station	NW14-20-25-W4	Kelly Malmberg (403) 485-3103
Vulcan County	Vulcan Waste Transfer Station	SW4-17-24-W4	Kelly Malmberg (403) 485-3103
Wainwright, MD of	Wainwright – Crop Tech Agro	SW28-44-6-W4	James Schwindt (780) 842-4454
Warner, County of	Border Seed Cleaning Plant	SW29-2-14-W4	Jamie Meeks (403) 642-3635
Warner, County of	Sunshine Seed Cleaning Plant	NW12-6-19-W4	Jamie Meeks (403) 642-3635
Westlock County	Westlock Regional Landfill	NE27-59-26 W4	Dennis Mueller (780) 349-3346
Wetaskiwin, County of	Peace Hills Waste Transfer Station	SW29-46-24-W4	Steve Majek (780) 352-3321
Wheatland County	Hussar Waste Transfer Station	NW1-24-20-W4	Russ Muenchrath (403) 934-3321
Wheatland County	Standard Waste Transfer Station	SW10-25-22-W4	Russ Muenchrath (403) 934-3321
Wheatland County	Strathmore Waste Transfer Station	NE34-23-25-W4	Russ Muenchrath (403) 934-3321
Willow Creek, MD of	Willow Creek Regional Landfill	NW22-11-26-W4	Fred Goodfellow (403) 687-2603
Woodlands County	Fort Assiniboine – County Yard	SW2-62-6-W5	Dawn Fortin (780) 584-3866
Yellowhead County	Parkcourt Waste Transfer Station	SE35-54-08-W5	Vacant (780) 325-3782

Note: Some municipalities have other “temporary” sites for dropping off empty pesticide containers. Phone municipal contact for locations and operating hours.

Safety Precautions

Warning Symbols

Visual warning symbols on pesticide labels indicate the kind of harm that can result from pesticide misuse or mishandling. They alert the user to the degree of the hazard (by the shape of the border) and to the type of hazard (by the centre picture).

Flammable



The "fire" symbol is a warning that the pesticide is flammable or easily ignited. Keep the pesticide away from heat, sparks or open flames. Do not smoke while mixing or applying the product.

Explosive



The "exploding grenade" symbol indicates that the pesticide can explode, e.g. pesticide in pressurized cans. Explosive conditions may also be created by using Roundup or Rustler (glyphosate) in a galvanized steel spray tank.

Corrosive



The "corroded hand" symbol indicates that the pesticide is corrosive to the skin and eyes. The chemical is either acid or alkali (caustic) and can burn the skin. Protect the skin and eyes when using these products.

Poisonous



The "skull and crossbones" symbol warns that the chemical is poisonous if taken into the body. Keep the product out of reach of children. Use the appropriate safety measures when dealing with poisonous products.

Pesticide Toxicity, Hazard and Risk

The terms "toxicity," "hazard" and "risk" do not all have the same meanings. Users of pesticides should understand the difference in meanings among these terms.

Pesticides vary in **toxicity** or the degree of being poisonous. How poisonous a pesticide is depends on its inherent chemical and physical properties.

The relative **hazard** of a pesticide depends on the toxicity of the pesticide, the dose received and the length of time exposed. No hazard exists when the pesticide container is sealed, but once the seal is broken and the pesticide is handled, exposure can occur, and a hazardous situation is created.

Risk of exposure is a function of how an individual handles the product. Although the hazard may be the same whenever a pesticide is being poured into the spray tank, the risk is different if one person wears a hard hat, goggles, respirator, nitrile gloves, waterproof apron and neoprene or rubber boots and the other person wears none of these. A knowledge of the toxicity of a product and the potential for personal exposure can be used to lower the risk of exposure. The user can control the risk by carefully managing the hazard. Even when highly toxic pesticides are used, if the degree of exposure is kept low enough, the risk can be kept at an acceptable level. The toxicity of the pesticide can't be changed, but the risk can be managed.

LD₅₀ values are used to rate the toxicity of the pesticides. The LD₅₀ is an abbreviation for the dose (expressed in milligrams per kilogram of body weight of the test animal) that is lethal to 50 per cent of the

The following table relates the oral LD₅₀ value (mg/kg) of a pesticide to its toxicity symbol.

LD₅₀ less than 500 mg/kg
indicates high
toxicity



Danger Poison

LD₅₀ 500 - 1,000 mg/kg
indicates moderate
toxicity



Warning Poison

LD₅₀ 1,000 - 2,500 mg/kg
indicates low
toxicity



Caution Poison

LD₅₀ greater than
2,500 mg/kg indicates
very low toxicity

group of test animals. For example, if a pesticide has an oral LD₅₀ value of 10 mg/kg and the test animals each weigh 1 kg, 50 per cent of the animals would die of poisoning if each ate 10 mg of the pesticide.

The smaller the LD₅₀ value, the more toxic the pesticide. The LD₅₀ value usually refers to the active ingredient in the pesticide formulation. In this publication, the LD₅₀ of the formulated product is also given when available.

Symptoms of Poisoning

Pesticide poisoning can be acute (due to a single, large dose, like an accident) or chronic (due to continued exposure over a long period). For example, chronic health problems may develop after long term exposure to pesticides low in toxicity. Accidental contact with a pesticide, however, will not necessarily lead to poisoning. Both types of poisoning can exhibit mild, moderate or severe symptoms as follows:

Mild poisoning symptoms: Mild symptoms may be vague and can be compared with a sickness such as influenza. Typical symptoms include nausea, headache, tightness of chest, loss of appetite and stomach cramps. These symptoms can be immediate or be delayed by 12 to 24 hours.

Moderate poisoning symptoms: These symptoms are usually more pronounced than mild symptoms. They include nausea, trembling, lack of muscle co-ordination, excessive saliva, blurring of vision, tightness of chest, difficulty in breathing, flushed or yellow skin, abdominal cramps, vomiting, diarrhea, tearing from eyes, profound weakness, rapid pulse and cough.

Severe poisoning symptoms: Severe symptoms are often more specific and require immediate hospital treatment. They include vomiting, diarrhea, excessive sweating, inability to breathe, convulsions, fever, intense thirst and coma. It is imperative to reduce exposure when using all pesticides whether they are highly toxic or have very low toxicities.

Reducing the Risk of Exposure to Pesticides

Pesticides may enter the body through the skin (dermally), the mouth (orally) or the nose (inhalation).

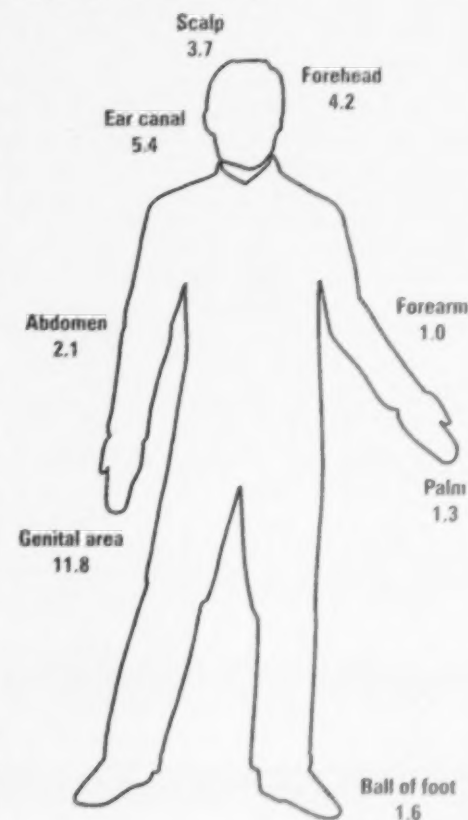
Skin

Absorption through the skin is the most common route of exposure. Different areas of the body absorb pesticides at different rates. For example, assuming the forearm is given an absorption rate of 1.0, the relative absorption rate of pesticides in the ear canal is 5.4, on the scalp 3.7, on the forehead 4.2 and the genital area 11.8 – almost 12 times greater than the forearm.

The genital area and the head are the areas where absorption is the greatest.

Absorption Rates

Compared to forearm, which is 1.0



Reducing the risk of exposure through the skin is possible through the careful selection, use and care of protective clothing and safety equipment.

Protective clothing and equipment can provide a barrier that reduces contact between the skin and pesticides. See the section on *Protective Clothing and Equipment* for recommended wear. To help reduce pesticide build-up, clothing should be washed daily using recommended procedures; see *Cleaning of Clothes and Equipment* section.

How skin is exposed to pesticides:

- Direct handling of pesticides – this includes any activity where the pesticide could come into direct contact with the skin, from spills and splashes during mixing and handling of the concentrated pesticide, during equipment adjustment and from spray drift during application. The greatest risk occurs when the chemical concentrate is being handled; extra protection should be used at that time. The use of a waterproof apron is highly recommended when handling all pesticide concentrates, regardless of toxicity.
- Transfer from contaminated clothing or equipment – clothing worn during pesticide use should be restricted to that use only, thereby eliminating the possibility of continued dermal exposure due to pesticide residues remaining in the clothing. Some types of concentrated pesticides are not removed after multiple washings. Clothing contaminated by accidental spills of concentrated pesticide should be discarded rather than laundered. Avoid entering the house wearing contaminated clothing and equipment. Pesticides may be transferred from boots to floors and carpets where children and pets may be exposed.
- Transfer to other clothing during washing – always store and wash pesticide-contaminated clothing separately from the rest of the family wash as pesticides can be transferred to other clothing during the laundering process.

Protective Clothing and Equipment

Even pesticides not absorbed by the skin may still cause skin problems such as redness, blisters or dry scaliness, which may lead to serious skin eczema and dermatitis. Good personal hygiene is important to help minimize pesticide absorption through the skin. Shower, shampoo your hair and put on clean clothing immediately after you finish using pesticides for the day or after an accidental spill. Cuts and scrapes should be cleaned and bandages changed after handling pesticide to avoid possible dermal absorption from contaminated bandages.

Eyes

Eyes are very sensitive to pesticides and can be exposed to vapour or fumes, dust, spray drift, or accidental spills and splashes when containers of liquid concentrates are being opened or when the concentrated chemical is being poured into the sprayer tank. Do not wear contact lenses when mixing or applying pesticides.

Ears

Sprays and spills may contaminate the head and ear canal.

Nose

Pesticides can enter the body through breathing in fumes, dusts or spray mists. Fumes and extremely fine particles of dust or spray can be completely absorbed by the lungs. To minimize exposure, respirators always should be worn when opening and mixing all concentrated pesticides. Read the pesticide label and follow the precautions outlined. A respirator may be required when applying pesticides.

Mouth

Pesticides can enter the body through the mouth when users eat, lick their lips or smoke when hands are contaminated. Face and hands should be washed thoroughly prior to eating or smoking. Children may be poisoned if they drink pesticides stored in pop bottles. All pesticides must be stored in their original containers and should be placed in a locked area out of reach of children.

Minimum Protection

A minimum level of protection is required when working with dilute, less toxic or granular pesticides. Where there is a direct contact with the pesticide, add extra protection.

Hard hat
(wide brimmed,
no leather liner)

Coveralls
cloth or disposable
(wear closed at neck,
over long-sleeved shirt
and full-length pants)

Gloves
unlined, nitrile or
neoprene (cuff gloves
and wear sleeves over
gloves)

Boots
neoprene overboots or
high rubber boots
(wear pants outside boots)



Extra Protection

Extra protection is required for mixing, loading and handling pesticide concentrates, especially when working with highly toxic pesticides. Check pesticide label.

**Goggles or
face shield**

Respirator
(check label if needed
for less toxic pesticides)

Hooded coveralls
chemically resistant
(when mixing,
loading or applying
very toxic pesticides
and when application
drenches applicator)

Waterproof apron
(when handling all
concentrated pesticides)



Coveralls

Wear coveralls, closed at the neckline and wrists and over full-length pants and long-sleeved shirts, also worn closed at the neckline and wrists.

Minimum protection

- Cloth – if cotton or cotton/polyester coveralls are worn, they should be washed after daily use. Some pesticides are difficult to remove from cloth.
- Disposable, nonwoven – a number of limited use, disposable, nonwoven, hooded coveralls are now on the market; instead of laundering, they are disposed of at an approved landfill and thus, the problem of decontamination is avoided. Not all disposables are suitable for pesticide use, especially for liquid pesticides. Check with your supplier. Common disposable brands are Kimberly-Clark KleenGuard LP (Liquid Protection) and DuPont Tyvek. Both disposables provide an extra layer of protection. Check for comfort and size before purchase. Disposable coveralls are more fragile than standard ones and are only expected to last a limited number of wearings.

Extra protection

- DuPont's Tyvek QC (polyethylene coated Tyvek) and Tyvek/Saranex (saran coated Tyvek) provide greater durability and are more repellent to larger pesticide spills. However, they are more expensive and must be specially ordered. These coveralls are uncomfortable when worn for long periods in hot weather because of heat build-up and lack of breathability.
- Impermeable rainwear – two styles are available: coveralls or two-piece suits. They are similar in price to the more expensive disposable coveralls. Generally, they are a P.V.C. (polyvinyl chloride) coating on nylon. Although excellent in liquid repellency, they too can be uncomfortable because they do not breathe and cannot be worn for long periods in hot weather. After use, they should be hosed down and washed with soap and water.

Remember, When Using Disposable Coveralls . . .

- Before purchasing any disposable coveralls, make sure they are recommended by the manufacturer for pesticide use. Avoid wearing all-purpose disposables.
- When removing disposable coveralls, take care not to contaminate the interior if the coveralls are to be worn more than once. Between wearings, hang in a well ventilated area, away from other clothing.
- Do not launder disposables, but do launder all clothing worn under disposables, just as you would other clothing worn during pesticide use.
- Replace with a new coverall when severe pilling (balls of fiber on the surface), rips or holes occur. To discard, place in a plastic garbage bag and take to an approved landfill site; do not burn.

Gloves

Unlined gloves are required when handling, mixing or pouring concentrated pesticides, during field application and when equipment needs adjusting. Never use bare hands to do these jobs. Studies reveal that the greatest exposure is often through the hands. A variety of glove materials may be found on the market. Unlined nitrile and neoprene gloves are suitable for most pesticides. All gloves should be washed soon after the concentrated chemical has been mixed as pesticide may penetrate into the material if it is not cleaned off. Care should be exercised to avoid contaminating the interior of gloves when they are taken off and put on. If possible, wash the outside of the gloved hands prior to glove removal, to avoid contaminating the interior. At the end of the day, both the inside and outside of the glove should be washed.

Prior to use, inspect gloves and replace immediately if cracks, swelling, discolouration, holes or rips develop. Cuff glove and wear sleeves over top of gloves to help prevent spills and splashes of pesticides from running down inside the gloves. Do not continue to wear contaminated gloves and avoid wearing leather, cloth or natural rubber gloves as they soak up the chemical and become a source of continuous contamination.

Boots

Neoprene overboots or long rubber boots are the recommended footwear as they are less likely to absorb pesticides and are more easily cleaned. Be sure to wear the pant leg over the boot to avoid pesticides running down into the boot. In case of such an accident, wash the boots out immediately; otherwise, wash the outside of the boots daily.

Minimum protection

Prevent powders, dusts or spray mists from being deposited on the hair or scalp by wearing a hard hat. The hard hat should be washed daily. Avoid the use of a hard hat with a leather inner band.

Extra protection

Protect hair, scalp, ears and neck from dust, sprays and spill when you are likely to contaminate the head area. Wear a wide brimmed hat that covers the neck or hooded coveralls, with the hood under the hard hat. Only wear ear plugs if required for hearing protection. Use disposable ear plugs made of self-molding foam, and dispose of them after use.

Goggles or face shields

Protect the eyes and face against pesticide vapours, dust and splashes when handling concentrated pesticides. Goggles and face shields must have resistance to chemicals and have ventilation to prevent fogging. Clean after each day of use and store away from direct sunlight.

Avoid Wearing

(These materials absorb chemicals and prolong exposure to the wearer; most are not easily cleaned).

- fabric baseball caps
- cloth or leather gloves, shoes or boots
- natural rubber or plastic gloves (not resistant to pesticides)
- leather belts, watch bands, PDA and cell phone holders
- contact lenses

Respirators

Purchase a respirator recommended for the pesticides used and make sure it fits properly. A good airtight fit is required over the nose and mouth; beards and moustaches can prevent a close fit.

Respirators have two cartridges attached onto a facepiece. Each cartridge contains a pre-filter that removes dust particles and a filter of activated charcoal that absorbs the chemical. The cartridges should be unscrewed and replaced as soon as any odor of the pesticides is detected in the facepiece. Clean respirators after each day's use; unscrew the cartridges and wash the facepiece with soap and water. Rinse the facepiece in clean water, dry with a clean cloth and screw on the cartridges. The clean respirator should be stored away from direct sunlight in a sealed plastic bag to prevent cartridges from absorbing airborne contaminants. Disposable respirators are also available. Replace as soon as any pesticide odor is detected. Wash after daily use – do not get the charcoal filter wet. Store in a sealed plastic bag. **Note:** Gauze and dust masks are not respirators and are not recommended for pesticide use!

Gas masks

These are used when an applicator is likely to be exposed to very high levels of pesticides (fumigants). The face piece covers the eyes, nose and mouth. It is connected by a flexible hose to a charcoal canister worn on the belt. The lifespan of this canister is longer than that of the respirator cartridges. Manufacturer's directions are to be followed for cleaning and storing gas masks and canisters.

Minimize Exposure

- wear recommended protective clothing and safety equipment
- limit clothing worn for pesticide use to that use only
- wash clothing and equipment daily after use
- replace clothing and equipment that is no longer serviceable

Cleaning of Clothes and Equipment

Skin can absorb chemicals from inadequately cleaned clothing and equipment. Safe removal of pesticide demands special care in handling and washing contaminated clothes.

Handling pesticide soiled clothing

- handle soiled clothing with unlined, nitrile gloves
- remove pesticide granules from cuffs and pockets outdoors
- discard any garment saturated with pesticide concentrate
- temporarily store clothing in disposable plastic bags before washing
- take disposables to approved landfill

Washing pesticide soiled clothing

- wash daily
- wash separately from regular laundry
- pre-treat with a stain removal product if an emulsifiable formulation used, or
- pre-rinse on pre-soak cycle of washer
- avoid overcrowding washer
- use hot water setting
- use full water level and normal cycle
- use extra heavy duty detergent as recommended for heavily soiled loads
- repeat wash procedure
- clean washer after use (run empty washer through full cycle with hot water and detergent)

Drying

- line dry to prevent contamination of dryer and increase the chemical breakdown of pesticide residues

Washing other equipment

- wash other equipment daily in hot soapy water: hard hat, goggles, apron, gloves, boots and respirator (avoid getting charcoal wet; remove if possible)

Specific Cleaning Procedures for Pesticides

The standard washing procedure mentioned above reduces pesticides from contaminated clothing, but new research is gradually identifying more specific washing procedures to further reduce the residues on contaminated clothing or equipment. Note that each product requires unique washing procedures, and more testing is required for those that still have high residues remaining. Refer to the guide below:

Recommendations

- 18 per cent residue is an unacceptable level. For better protection, choose a disposable coverall and discard after use.
- Soak contaminated clothing in undiluted limonene for required time. (Examples of this product are Odor Crush or Citra-Solv.).
- Pre-treat contaminated clothing before washing, let soak.
- Fill 70 L washing machine with warm water (50°C); add 280 mL of chlorine bleach. Soak for required time. (**Note:** loss of strength and colour results from bleach soak, more so for cotton than for cotton/polyester blends)

Note: Acceptable levels of residue remaining – less than 3 per cent.

For further information on protective clothing for pesticide use, contact the Alberta Ag-Info Centre toll-free at 310-FARM (3276) or 1-866-882-7677.

Product	Suggested washing procedure	% Residue remaining
2,4-D (amine)	One wash	< 1%
2,4-D (ester)	1/2 hour Limonene soak (2) (degreaser), one wash	18% (1)
Captan	One wash	1%
Chlorpyrifos (Lorsban, Dursban, Pyrinex)	3 hour bleach soak (4), one wash	< 1%
Diazinon	Hot wash (60°C) or Spray'n Wash soak, one wash	1%
Iprodione (Rovral)	One wash	1%
Malathion (diluted)	Two washes	3%
Triallate (Avadex)	Spray'n Wash soak (3), two washes	18% (1)
Any concentrated pesticides	Discard	Too high

Source: *Effective Pesticide Decontamination Procedures for Clothing, Equipment and Spills*, Research Project Report, University of Alberta, Alberta Occupational Health and Safety Heritage Grant Program, 1994.

Other Precautions and Safety Tips

Fresh water supply

Always carry a supply of fresh water to clean up accidental spills and a clean pair of gloves for equipment adjustments.

Remote control devices

Devices (e.g. solenoid valves) can be installed to remotely control the sprayer, preferably from within the tractor cab. These devices can reduce operator exposure to pesticides.

Tractor cab cleanup

After spraying pesticides, the inside of the tractor (seat, steering wheel, etc.) can be decontaminated by wiping with warm soapy water and a sponge.

Tractor cab filters

Charcoal filters are available for fitting onto the tractor air intake system, to filter out pesticides from the air entering the tractor cab. The use of these filters is highly recommended to reduce pesticide exposure during spraying operations. Check with tractor manufacturers to determine which charcoal filter is recommended for your tractor.

Grazing and Haying Restrictions

Traditionally, pesticides have been registered for use on crops grown to maturity. Grazing or cutting of the immature crop for hay has not been considered as the intended use, so residue information on the immature plant has not been requested in the registration process. A grazing or haying interval is considered in the registration process only if the green matter is to be fed to livestock. Consequently, many pesticide labels are currently silent about grazing, i.e. there is no statement on the label as to whether or not it is safe to graze the crop(s) listed on the label prior to maturity. The absence of this information may lead producers to assume that since there is no specific warning with respect to grazing, it is safe to do so.

Present pesticide labelling policy is meant to define only the acceptable uses of the product. It does not list or take into account the "do not's." Therefore, it cannot be assumed that if something is not stated on the label, it is accepted for use. A new accepted use can only be made through the submission of relevant data to support that use.

In light of the above, pesticide labels that are silent on grazing will carry the following statement: "Do not graze the treated crops or cut for hay; there are not sufficient data available to support such use."

Honey bee safety

Bees may be affected by pesticides. Avoid spraying near hives or contaminating puddles of water from which bees may drink. Spray early in the morning or late in the afternoon when bee activity is at a minimum. Warn beekeepers of your intentions, so they can confine the bees or move them until spraying is over.

Farm Safety Program

For further information on farm safety, please contact the Farm Safety Program of Alberta Agriculture and Rural Development at 7000 - 113 Street, Edmonton, Alberta, T6H 5T6.

Safety Equipment and Clothing

Protective clothing and equipment is available from the following:

Local U.F.A. and safety equipment suppliers
 Fleck Bros.
 1-800-262-9063
 Levitt-Safety Limited
 1-800-661-3973
 Acklands-Grainger Inc.
 1-800-661-3950

First Aid

Poison Information Centres
(Alberta) 1-800-332-1414
(Calgary only) 944-1414

The emergency department of most hospitals can deal with pesticide poisoning. However, the Poison Centre in Calgary can provide information on recognizing poisoning symptoms and in giving the right treatment. It offers a 24-hour toll free service.

Some manufacturers have emergency telephone numbers to call in case of pesticide poisoning.

BASF Canada
1-800-454-2673

Bayer CropScience Inc.
Prosar
1-800-334-7577

Dow AgroSciences Canada Inc.
1-613-996-6666

DuPont Canada Inc.
1-613-348-3616

Monsanto Canada Inc.
1-314-694-1000 or 1-800-332-3111

Nufarm Canada
1-202-483-7616 (collect)

Syngenta Crop Protection Canada Inc.
1-800-327-8633

United Agri Products
1-800-561-8273

Interprovincial Cooperative Ltd.
1-613-996-6666

Standard First Aid Measures

Before using a pesticide, look for the warning symbol on the label. This label indicates the toxicity of the pesticide. If you are severely exposed to a pesticide and you are alone, do not panic. The symptoms of the pesticide do not show up immediately. You will have some time to decontaminate yourself.

If in eyes

Wash eyes with water at once. Hold the eyelids open and wash eyes for at least 15 minutes with fresh water each time. Get help to take you to the emergency department of the nearest hospital and take the labelled container with you. Do not use any eye medication unless prescribed by a doctor.

If on skin

Get any spilled pesticide off your body immediately. If the pesticide is on your clothes, remove them and rinse your skin with water. After rinsing, wash the area with soap and water. Obtain medical attention if area of contact is large or if irritation persists.

If swallowed

If swallowed: Have the person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control centre or doctor. Do not give anything by mouth to an unconscious person.

If the product contains a petroleum distillate:

If swallowed: Call a poison control centre or doctor immediately for treatment advice. Do not induce vomiting unless told to do so by a poison control centre or doctor. Do not give any liquid to the person. Do not give anything by mouth to an unconscious person.

If inhaled: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible.

Glossary of Terms in Pest Control

Active ingredient (a.i.): The concentration of chemical in a formulated product responsible for action.

Antagonism: Opposing action of different chemicals such that the sum of their total effect is less than the effect if each pesticide were used alone.

Antidote: A first aid treatment to offset the toxic effect of a pesticide.

Bioassay: Determination of concentration of a pesticide by comparing its effect on a test organism with that of a standard preparation.

Adjuvant: Any substance added to a pesticide formulation or spray tank to facilitate application.

Chlorotic: Loss or fading of green colour in foliage.

Contact pesticide: Causes localized injury to plant tissue, or causes an effect when the pesticide hits the pest or the pest contacts the treated surface.

Degradation: Breakdown of a pesticide by action of air, water, sunlight, microbes or other agents.

Desiccant: Chemical use to accelerate drying of plant tissues.

Efficacy: Effectiveness of chemical on the pest.

Established forage: A forage crop that has gone through three months of a growing season.

Foliar application: Made to the leaves of plants, as opposed to soil application.

Formulation: Form in which the manufacturer prepares a pesticide to facilitate its use: granular, solution, emulsifiable concentrate, dry flowable, liquid flowable, wettable powder.

Fumigant: Vapour active chemical used against pests.

Incompatibility: Where one pesticide is mixed with another causing unsatisfactory results.

Inhibit: Prevent or stop a process, e.g. inhibits photosynthesis.

LC₅₀: Lethal concentration – amount of pesticide in air or water that can kill 50% of the organism.

LD₅₀: Lethal dose – quantity of herbicide that will kill 50% of a test population.

Mode of action: The specific mechanism through which a pesticide affects a pest.

Necrosis: Localized death of plant tissue, usually characterized by browning and desiccation.

Non-cropland: Land not in crop production or not intended for crop production.

Pesticide group: A number of pesticides that have the same mode of action.

Photosynthesis: Process by which green plants use sunlight, carbon dioxide and water to produce plant food.

Phytotoxic: Injurious to a plant.

Plant growth regulators (PGR): Chemical that affects the normal growth process of plants.

Preharvest interval (PHI): Time (days) between the last application of the pesticide and harvest. Harvest includes cutting (swathing) or grazing; it does not include combining or baling for hay.

Residual herbicide: Persists in soil, kills regrowth and/or germinating seedlings over an extended time.

Resistance: A genetic change in a pest population as a result of selection by a pesticide, which results in a loss of control.

Synergism: Complementary action of different pesticides such that the total effect is greater than the sum of their independent effects.

Systemic pesticide: Able to move in the plant, insect or other organism from the initial point of contact.

Weed control: A minimum of 80 per cent reduction in weed stand and/or growth.

Weed suppression: A minimum of 60 per cent reduction in weed stand and/or growth.

Alberta Agriculture and Rural Development Offices

Alberta Ag-Info Centre
Call toll-free 310-FARM (3276)

Field Offices

Location	Address	Phone Number	Fax Number
Airdrie	97 East Lake Ramp NE	403-948-8546	403-948-2069
Barrhead	2nd Floor Provincial Building 6203 - 49 Street	780-674-8268	780-674-8309
Brooks	CDC South Hargrave Building #6 301 Horticultural Station Road East	403-362-1321	403-362-1326
Camrose	5712 - 48 Avenue	780-679-5173	780-679-5175
Fairview	213 Provincial Building 10209 - 109 Street	780-835-7536	780-835-3600
Grande Prairie	1201 Provincial Building 10320 - 99 Street	780-538-6208	780-538-5288
Leduc	Agri-Food Business Centre 6547 Sparrow Drive	780-980-3534	780-980-4237
Lethbridge	Agriculture Centre 5401 - 1 Avenue South	403-381-5849	403-382-4526
Olds	201 Provincial Building 5030 - 50 Street	403-556-4328	403-556-7545
Red Deer	Provincial Building 4920 - 51 Street	403-340-5532	403-340-4256
Stettler	Provincial Building 4705 - 49 Avenue	403-742-7540	403-742-7527
Stony Plain	Provincial Building 4709 - 44 Avenue	780-968-3516	780-963-4709
Vermilion	Provincial Building 4701 - 52 Street	780-853-8240	780-853-4776

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Chemical Weed Control in Alberta

Chemical weed control functions on the basis that certain chemicals are capable of killing some kinds of plants (weeds) without injury to other kinds (crops). As a group, these chemicals are called herbicides.

Herbicides are effective tools for the control of weeds, and **herbicides demand respect**. When properly used, herbicides can safely and effectively accomplish their objective; misused, they can cause severe economic loss. The misuse of herbicides is usually due to:

- ignorance of their characteristic activity and/or
- carelessness in their application

Misuse includes such factors as applying improper dosages; using the wrong herbicide; failure to properly calibrate application equipment; failure to wash application equipment thoroughly before switching herbicides; improper soil incorporation; timeliness of application, with respect to the growth stage of crop or weed.

This guide lists the major herbicides registered for field crop use in Alberta. Refer to product labels attached to the herbicide containers for final detailed information.

Conservation tillage and herbicides

Conservation tillage is a general term used to describe a cropping program in which some or all of the tillage operations are replaced by using herbicides to control weed growth while, at the same time, preventing soil erosion and conserving soil moisture.

The following terminologies are included under conservation tillage: reduced tillage, minimum tillage, no-tillage or zero tillage, direct drilling and chemical fallow.

Herbicides for conservation tillage are listed below. Rates of application, weeds controlled and other pertinent information can be found by referring to each herbicide in this guide.

- **2,4-D or MCPA** - To control winter annuals such as flaxweed, shepherd's-purse and stinkweed. Application should be made to emerged weeds prior to freeze-up.
- **Glyphosate Formulation** - Apply any glyphosate formulation mixed with a non-ionic surfactant (if required) to actively growing weeds. Can be tank mixed with Banvel; 2,4-D amine; Pardner.
- **Rustler** - Controls annual grasses, broadleaf weeds and volunteer cereals. Can be tank mixed with 2,4-D.

Nitrate poisoning of livestock

Nitrate accumulations may be caused by leaf damage from frost, hail or herbicide action. Symptoms of nitrate poisoning include reduced milk production and growth rate, abortions and in severe cases, death by suffocation. A veterinarian should be called immediately if livestock show unusual symptoms when they are fed forages that may contain nitrates.

After severe frost, hail or herbicide damage, the nutrient value of the crop will decrease rapidly. In

terms of nutrition, it is important to harvest as soon as practical; however, in the case of herbicide treated crops, there may be a waiting period specified on the herbicide label. Especially in the case of high risk crops, such as oats or corn, a delay may be advisable to permit nitrate levels to decrease. If there is a possibility of high nitrates in feed, have the feed analyzed at a feed testing laboratory.

Weed control in forage crops

Make sure all forages, as well as any companion crops, present in the stand are listed for the intended use on the herbicide label. Follow the label directions on the herbicide container closely, especially for stage of crop and weed development, water volume, grazing and feeding restrictions.

Herbicide performance ratings

Herbicide performance ratings (numbers in brackets after the names of crops or weeds) are based on data from the Expert Committee on Weeds (Western Section) Research Reports. These numbers are not absolute and, therefore, not a guarantee of expected performance. They are meant to be used as a guide when selecting a herbicide. When a number is not included, there is not sufficient data to provide a rating.

Tolerance of crop to herbicides

The number appearing in brackets following the crop on which each herbicide is registered represents the expected tolerance of the crop to that herbicide. Due to variations in variety, weather, timing and application techniques, this number is only approximate. 0 = complete kill of the crop and 9 = no measurable injury to the crop.

Level of weed control with each herbicide

The number appearing in brackets after each weed represents the average level of weed control expected with the herbicide. Due to variation in weather, growth stage, time of day, application technique, etc., this number is only approximate.

0 = no control of the weed and 9.0 = complete kill of the weed. A weed control rating of 7.0 or greater is considered commercially acceptable.

Water Used for Spray Application

The quality of water used can affect the efficacy of some herbicides. Water quality includes the cleanliness (silt, organic matter and soil), the hardness or softness of the water and the water pH.

Some herbicides, including glyphosate containing herbicides, adsorb to silt and organic matter, become inactivated. This causes a decrease in herbicidal activity. Suspended soils and organic matter in water is usually a problem where surface water is being used.

Other herbicides, including 2,4-D amine and several Group 1 herbicides have reduced efficacy when applied in mineralized water. Minerals include both calcium and magnesium sulfates, which result in 'hard' water, and excessive sodium bicarbonate, which results in 'soft' water. Mineralized water is most commonly a problem when well-water is used. When efficacy decreases, it is most apparent on hard to control weeds and is easily confused with late application, poor growing conditions or reduced herbicides rates.

Herbicide and Water Quality

Herbicide	Quality concern	Remedy
2,4-D amine*	Mineralized water	Use a non-ionic surfactant like Agral 90
Achieve (tralkoxydim)	Mineralized water	Add ammonium sulfate (1% v/v)
Poast (sethoxydim)	Mineralized water	Add ammonium sulfate (1% v/v)
Roundup/Touchdown	Mineralized water	Add ammonium sulfate fertilizer 3 kg/100 L application solution
Roundup/Touchdown	Silty or dirty water	Filter water or use clean water
Select (clethodim)	Mineralized water	Add ammonium sulfate (1% v/v)

* Note: 2,4-D Ester formulation is not affected.

Information primarily derived from F. A. Holm, J. L. Henry, D. W. Gruber and P. McMullan, 1995 Water quality effects on phenoxy and ACCase inhibiting herbicides. Proceedings of the Weed Research/Symposium, University of Alberta.

The pH of water or water temperature can affect the ability of some herbicides to stay dissolved in the spray solution. To avoid these problems, the manufacturer will suggest a specific order to add surfactant or mixtures of products. For example, to mix the herbicide Horizon, the herbicide is added first, followed by the surfactant, Score, and all mixing is done under agitation. Other water conditioners out there include Choice Weather Master and N-Tank. Follow label recommendations for mixing. Products cannot work unless they are dissolved or miscible (capable of being mixed) in the water. Also, if products are not in solution they can form a sludge in the spray tank and block nozzles.

It is best to avoid using poor quality water if possible; however, the following remedies can limit the loss of herbicidal activity.

Pesticide Resistance

The Problem

Agricultural pests can develop resistance to fungicides, herbicides or insecticides. Resistance occurs when some pests survive a pesticide application; this part of the population is naturally more tolerant to the chemical. These individuals reproduce and create a population that is resistant to the pesticide. Producers should follow agronomic practices that both prevent or minimize the development of resistance and prevent the spread of existing resistant populations.

Since the first documented case of chickweed resistance in the mid 1980's, the numbers of herbicide resistant weeds, fungicide resistant diseases and insecticide resistant bugs have increased and the area infested by them continues to grow. At present in Alberta, more than 10 weed biotypes are resistant to chemicals from six herbicide groups. Potato blights are known to have developed resistance to common fungicides. Some insect pests are resistant to the *Bacillus thuringiensis*, a common biopesticide. In addition, some resistant pests are resistant to more than one pesticide group (see table below). It is essential that producers be able to identify these resistant pests and take action to minimize or prevent the development of resistance on their farms.

How to identify herbicide resistance

Investigate all areas of the sprayed field where weed control did not occur. Rule out other factors that might have affected herbicide performance including

mis-application, spray misses, unfavorable weather conditions, herbicide application at an improper leaf stage and weed flushes after application. If resistance remains a likely possibility, check for the following:

- Are other weeds listed on the product label controlled satisfactorily?
- Is herbicide failure patchy with no reasonable explanation?
- Did the same herbicide or herbicide group fail in this area of the field in the previous year?
- Do weeds show herbicide injury symptoms such as root pruning by a Group 3 herbicide or yellow/purple coloration caused by Group 2 applications. Resistant weed biotypes will not show these typical injury symptoms.
- Do field histories indicate extensive use of the same herbicide (or herbicide group) year after year?

How to minimize the development of resistance

Follow the guidelines below to delay the appearance of resistance:

- **Integrated weed management practices** – use herbicides as part of an integrated control program that includes scouting, historical information related to herbicide use and crop rotation, and consider mechanical, cultural, biological and other control practices.
- **Herbicide and crop rotations** – herbicides must be rotated. It is important not only to use a different herbicide, but to use one from a different herbicide group with a different mode of action.
- **Field history** – records are needed to make sensible decisions on herbicide rotation and to evaluate the probability of resistance developing. A pesticide application record sheet can be found at the back of this book.
- **Tank mixture** – a tank mix may delay the appearance of resistant weeds if the components of the tank mixture control the same weed by a different mode of action.
- **Monitor results** – Monitor treated weed populations for resistance development.
- **Preventive measures** – prevent the movement of resistant weed seeds to other fields by cleaning harvesting and tillage equipment as well as planting clean seed.

Herbicide Resistant Weeds in Alberta

Herbicide group	Weeds
Group 1	Green foxtail, wild oats
Group 2	Ball mustard, chickweed, cleavers, hemp-nettle, kochia*, Russian thistle, spiny annual sow thistle, stinkweed, wild mustard, wild oats
Group 3	Green foxtail
Group 4	Hemp-nettle
Group 8	Wild oats
Group 1 + 2 + 25 (multiple resistance)	Wild oats
Group 1 + 2 + 8 + 25 (multiple resistance)	Wild oats
Group 1 + 3 (multiple resistance)	Green foxtail
Group 2 + 4 (multiple resistance)	Cleavers

- Surveys of prairie kochia fields have found that approximately 90 per cent have Group 2 herbicide resistance. Without testing assume kochia found in Alberta is resistant as well and needs to be controlled with herbicides from a different herbicide group.

Herbicide resistance screening on suspect weeds can be performed by the Saskatchewan Crop Protection Lab (306-787-8130) for a fee, ranging from \$35 to \$100 per sample. Or contact the chemical company or the Alberta Ag-Info Centre toll-free at 310-FARM (3276).

Herbicide Group Classification by Mode of Action

Mode of action	Chemical family	Active ingredients	Found in*
Group 1			
Inhibitors of acetyl CoA carboxylase ACCase. These chemicals block an enzyme called ACCase. This enzyme helps the formation of lipids in the roots of grass plants. Without lipids, susceptible weeds die.	Aryloxyphenoxy propionate (Fop)	clodinafop-propargyl	Cypress, Foothills, Harmony K, Harmony SG, Horizon SG, Horizon BTM, Ladder, NextStep, Signal, Signal D, Signal M
		diclofop methyl	Hoe-Grass II
		fenoxaprop-p-ethyl	Bengal, Cordon, Fusion, Puma ¹²⁰ Super, Puma Advance, Tundra, Wildcat
		fluazifop-p-butyl	Fusion
		quizalofop-p-ethyl	Assure II, Muster Gold II
	Cyclohexanediones (Dim)	clethodim	Arrow 240 EC, Centurion, Select, Shadow RTM
		sethoxydim	Poast Ultra, Pursuit Ultra
		tepraloxym	Equinox, FlaxMax DLX, Odyssey DLX
		tralkoxydim	Achieve Liquid Gold, Liquid Achieve
			Titanium, Bison, Marengo
	Phenylpyrazolin (Den)	pinoxaden	Axial, Broadband

(continued)

Herbicide Group Classification by Mode of Action

Mode of action	Chemical family	Active ingredients	Found in*
Group 2			
ALS/AHAS inhibitors. These chemicals block the normal function of an enzyme called acetolactate (ALS) acetohydroxy acid (AHAS). This enzyme is essential in amino acid (protein) synthesis. Without proteins, plants starve to death.	Imidazolinones	AC 299,263 120 AS imazamethabenz imazamox imazamox + imazethapyr imazapyr imazethapyr	Altitude FX Assert 300, Assert FL Arfrenalin SC, Solo, Tensile, Viper Absolute, Odyssey, Odyssey DLX Arsenal Multistar, Pursuit
	Sulfonylamino-carbonyltriazolinones	flucarbazone sodium	Everest
	Sulfonylureas	chlorsulfuron	Telar
		ethametsulfuron methyl	Muster, Muster Gold II
		metsulfuron-methyl	Ally Toss-N-Go, Escort, Accurate, Express Pro
		nicosulfuron	Accent
		rimsulfuron	Prism
		thifensulfuron-methyl	Broadside, Deploy, Harmony K, Harmony SG, Nimble, Refine SG, Triton C
		triasulfuron	Unity
	Triazolpyrimidines	tribenuron-methyl	Broadside, Deploy, Express Pack, Express SG, Express Pro, Harmony K, Harmony SG, Nimble, Nuance, Refine SG, Refine M, Triton C, Triton K
		triflusaluron methyl	UpBeet
		florasulam	Assert FL, Benchmark, Broadband, Frontline, Frontline XL, Frontline 2,4-D, PrePass, Spectrum, Stellar
	Triazolones	thiencarbazone-methyl	Velocity m3
Group 3			
Microtubule assembly inhibitors. These chemicals inhibit the cell division in roots.	Dinitroanilines	ethalfluralin	Edge
		trifluralin	Advance, Bonanza, Fortress, Rival, Treflan

(continued)

Herbicide Group Classification by Mode of Action

Mode of action	Chemical family	Active ingredients	Found in*
Group 4			
Synthetic auxins. These chemicals disrupt plant cell growth in the newly forming stems and leaves; they affect protein synthesis and normal cell division, leading to malformed growth and tumors.	Benzoic acids	dicamba	Banvel II, Cypress, DyVel, DyVel DSp, Harmony K, Oracle Dicamba, Pulsar, Rustler, Sword, Target, Tracker XP, Triton K, Vanquish
	Carboxylic acids	clopyralid	Absolute, Curtail M, Eclipse III, Lontrel, FlaxMax DLX, Prestige, Prestige XC, Spectrum, Tensile
		aminopyralid	Milestone, Restore
		fluroxypyr	Altitude FX, Attain, Attain XC, Prestige, Prestige XC, Pulsar, Stellar, Trophy
		picloram	Grazon, Tordon 22K
		triclopyr	Remedy
	Phenoxy	2,4-D	2,4-D, Adrenalin SC, Approve, Attain, Attain XC, Benchmark, Calmix Pellets, Desormone, Dichlorprop-D, DyVel DSp, Estabrop, Frontline 2,4-D, Grazon, Leader, Restore, Signal D, Thrasher, Thumper, Titanium, Triton K, Turboprop 600
		dichlorprop (2,4-DP)	Desormone, Dichlorprop-D, Estabrop, Turboprop 600
		2,4-DB	2,4-DB, Caliber 625, Cobutox 625, Embutox 625
		MCPA	Achieve Liquid Gold, Altitude FX, Assert FL, Badge, Broadside, Buctril M, Clovitox Plus, Curtail M, Cypress, DyVel, FlaxMax DLX, Frontline, Frontline XL, Horizon BTM, Logic M, MCPA, Mextrol, Prestige, Prestige XC, Refine M, Signal M, Spectrum, Stellar, Sword, Target, Tracker XP, Topside, Trophy, Tropotox Plus
		MCPB	Clovitox Plus, Topside, Tropotox Plus
		mecoprop (MCP)	Compitox, Cypress, DyVel DSp, Mecoprop-P, Sword, Target, Tracker XP
		quinclorac	Triton C

(continued)

Herbicide Group Classification by Mode of Action

Mode of action	Chemical family	Active ingredients	Found in*
Group 5			
Photosynthetic inhibitors at Photosystem II, Site A. These chemicals interfere with photosynthesis and disrupt plant growth, ultimately leading to death.	Phenyl carbamates	desmedipham phenmedipham	Betamix, Betamix B Betamix, Betamix B
	Triazines	atrazine simazine	Atrazine, Laddok, Primextra II Magnum Princep Nine-T, Simazine 480
	Triazinones	hexazinone metribuzin pyrazon	Velpar DF, Velpar L Sencor Pyramin
	Uracils	bromacil	Calmix Pellets, Hyvar X/X-L, Krovar I
Group 6			
Photosynthetic inhibitors at Photosystem II, Site II.	Benzthiadiazoles	bentazon	Basagran, Basagran Forte, Laddok, Viper
	Nitriles	bromoxynil	Achieve Liquid Gold, Approve, Badge, Bromotril, Brotex 240, Buctril M, Hoe-Grass II, Horizon BTM, Infinity, Koril, Leader, Logic M, Mextrol, Pardner, Signal D, Signal M, Thrasher, Thumper, Titanium, Tundra, Unity, Velocity m3
Group 7			
Photosynthetic inhibitors at Photosystem II, Site B.	Ureas	diuron linuron	Diurex 80W, Karmex XP, Krovar I Linuron, Lorox
Group 8			
Lipid synthesis inhibitors (not ACCase inhibition). These chemicals inhibit the cell division and elongation in the seedling shoots before they emerge above ground.	Thiocarbamates	EPTC triallate	Eptam Avadex (Extra Strength) BW/MicroActiv, Fortess
	Pyrazolium	difenzoquat	Avenge 200-C
Group 9			
Inhibitors of EPSP synthesis. These chemicals inhibit the amino-acid synthesis.	None	glyphosate	Cheminova Glyphosate, Clearout 41, Cleanstart, Credit, Credit 45, Eclipse III, Factor 540, Glyfos, Knockout, Maverick III, NuGlo, PrePass, Renegade, Roundup Transorb HC, Roundup Ultra2 Roundup WeatherMax, Rustler, R/T 540, Sharpshooter, Sharpshooter Plus, Touchdown iQ, Touchdown Total, Traxion, Vantage Plus Max II, Wise Up

(continued)

Herbicide Group Classification by Mode of Action

Mode of action	Chemical family	Active ingredients	Found in*
Group 10			
Inhibitors of glutamine synthetase.	None	glufosinate ammonium	Liberty 150 SN, Liberty 200 SN
Group 11			
These chemicals inhibit the carotenoids biosynthesis.	Triazole	amitrole	Amitrol 240
Group 14	Aryl triazone	carfentrazone	Cleanstart
Inhibits an enzyme of chlorophyll and heme biosynthesis			
Group 15			
Inhibitors of cell growth and division.	Chloroacetamides	metolachlor propyzamide	Dual II Magnum, Primextra II Magnum Kerb 50W
Group 16			
Unknown.	Benzofuranyl alkylsulfonate	ethofumesate	Ethos SC, Nortron
Group 20			
Inhibits actively dividing meristems in roots and shoots as well as seed germination	Nitriles	dichlobenil	Casoron
Group 22			
Cell membrane disrupters. Chemicals that disrupt the internal cell membrane and prevent the cells from manufacturing food.	Bipyridyliums	diquat paraquat	Reglone Desiccant, Reward Gramoxone
Group 27	Pyrazole	pyrasulfotole	Infinity, Tundra, Velocity m3
Inhibits plant pigment biosynthesis and photosynthesis			

* A herbicide may appear in more than one group if it contains more than one active ingredient.

2,4-D (amine, ester)



Danger Poison

Manufacturers: IPCO/Nufarm Agriculture/UAP/Viterra

Group 4

Herbicides

Formulations

Product	Company	Active ingredient	Formulation	Container size
2,4-D 600 amine (PCP# 17511)	IPCO	560 g/L	Solution	2 x 10 L
2,4-D 600 amine (PCP# 14726)	Nufarm Agriculture	560 g/L	Solution	2 x 10 L
2,4-D 600 amine (PCP# 5931)	United Agri-Products	560 g/L	Solution	2 x 10 L
2,4-D 600 amine (PCP# 29248)	Viterra	560 g/L	Solution	2 x 10 L
2,4-D 700 ester (PCP# 27819)	IPCO	660 g/L	EC	2 x 10 L, 115 L, 205 L
2,4-D 700 ester (PCP# 27820)	Nufarm Agriculture	660 g/L	EC	2 x 10 L
2,4-D 600 ester (PCP# 27818) Salvo	United Agri-Products	660 g/L	EC	2 x 10 L
2,4-D 700 ester (PCP# 29006)	Viterra	660 g/L	EC	2 x 10 L, 115 L

Crops, Staging and Rates

Crop	Stage	Rate
Wheat, barley, rye (not under-seeded with legumes)	From the 4-leaf expanded to the early flag-leaf (shot blade) stage.	600 g/L formulation: up to 0.24 – 0.38 L/acre 700 g/L formulation: up to 0.323 L/acre
Winter wheat, fall rye	Spring: full tillering to the shot blade stage. Fall: do not apply to seedling in the fall.	600 g/L formulation: up to 0.24 – 0.38 L/acre 700 g/L formulation: up to 0.33 L/acre
Field corn	As an overall spray, before the corn is 15 cm tall (leaf extended) and/or before the 6-leaf stage. For later applications (corn 15-75 cm, leaf extended), use a shielded spray or a directed spray with drop pipes. Keep spray off corn foliage.	600 g/L formulation: up to 0.19 – 0.37 700 g/L formulation: up to 0.33 L/acre
Established grasses grown for forage and seed production	Spring: up to the shot blade stage of the grass. Fall: after harvest.	600 g/L formulation: up to 0.38 L/acre 700 g/L formulation: up to 0.33 L/acre
Established pasture and rangeland (without legumes)		600 g/L formulation: up to 1.62 L/acre 700 g/L formulation: up to 1.38 L/acre
Stubble land, roadsides, summerfallow	Apply at a time of rapid growth, usually May, June and/or September.	600 g/L formulation: up to 1.11 L/acre 700 g/L formulation: up to 0.95 L/acre
Golf courses (roughs and fairways only), sod farms	Apply at a time of rapid growth, usually May, June and/or September, before grasses are in the flag-leaf (shot blade) stage.	600 g/L formulation: up to 1.1 L/acre 700 g/L formulation: up to 0.77 L/acre (1.53 L per year)
Weeds and brush control (non-crop land)	Apply at time of rapid growth (usually May, June and/or September).	600 g/L formulation: 1.11 – 3.20 L/acre 700 g/L formulation: 1.31 – 2.75 L/acre
Basal bark and stump treatment		700 g/L formulation: 2.5 Litres in 100 L of diesel fuel. Spray to run-off.

2,4D (cont'd)**Weeds, Rate and Staging**

Apply at lower rates when weeds are small (2- to 4-leaf), growing rapidly, under good growing conditions. Higher rates are needed when weeds are larger, growing under stress conditions (dry or cold weather) or in heavy infestation.

Susceptible Weeds

0.22 – 0.38 L/acre (600 g/L) — One 10 L jug will treat 33 – 44 acres

0.19 – 0.32 L/acre (700 g/L) — One 10 L jug will treat 31 – 52 acres

Annual sow-thistle (6.2)	False flax	Narrow-leaved hawk's-beard	Stinkweed
Ball mustard (8.3) (8.2)	False ragweed	Prickly lettuce	Sweet clover (seedling)
Blue bur (before the 4-leaf stage)	Flixweed* (4.6) (7.4)	Ragweed	Thyme-leaved spurge
Burdock (before the 4-leaf stage)	Giant ragweed	Redroot pigweed (6.6)	Tumble mustard
Cocklebur	Hare's-ear mustard (8.3) (8.2)	Russian pigweed (7.0)	Volunteer canola
Common plantain	Indian mustard (8.3) (8.2)	Russian thistle (8.0) (7.5)	Wild mustard (8.3) (8.2)
Common ragweed	Kochia (5.9) (7.3)	Shepherd's-purse	Wild radish
Daisy fleabane	Lamb's-quarters (8.0) (8.3)	Stinging nettle	Wild sunflower
			Wormseed mustard (8.3) (8.2)

* Late fall applications or spring seedlings

Harder-to-control Weeds

0.40 – 0.61 L/acre (600 g/L) – One 10 L jug will treat 16.4 – 25 acres

0.34 – 0.53 L/acre (700 g/L) – One 10 L jug will treat 18.9 – 29.4 acres

Curled dock	Hairy galinsoga	Oak-leaved goosefoot	Tansy mustard
Dog mustard	Hawkweed	Pineapple weed	Tumble pigweed
Field pepper-grass	Heal-all	Prostrate pigweed	Velvetleaf
Flixweed**	Knotweed	Purslane	
Groundsel	Narrow-leaved hawk's-beard**	Sheep sorrel	

** Spring: prior to bolting

Very-hard-to-control Weeds (top growth only)

600g/L formulation: 0.40 – 0.61 L/acre – One 10 L jug will treat 16.4 – 25 acres

700g/L formulation: 0.45 – 0.53 L/acre – One 10 L jug will treat 18.9 – 22.2 acres

Biennial wormwood	Curled dock	Hemp-nettle*	Scentless mayweed
Blue lettuce	Dandelion (3.0)	Hoary cress	Smartweed* (6.5) (5.5)
Bull thistle	Field bindweed	Lady's-thumb*	Tartary buckwheat (5.2) (6.9)
Burdock	Field chickweed*	Leafy spurge	Teasel
Buttercup	Field horsetail*	Mouse-eared chickweed*	Volunteer sunflower
Canada thistle (4.6) (5.4)	Gumweed	Perennial sow-thistle	Wild buckwheat* (4.8) (5.3)
Chicory	Hedge bindweed	Russian knapweed	Yellow rocket

* Use highest listed rate for suppression.

Brush species

600g/L formulation: 1.11 – 2.22 L/acre – One 10 L jug will treat 4.5 – 9.0 acres

700g/L formulation: 1.31 – 2.53 L/acre – One 10 L jug will treat 4.0 – 7.6 acres

Alder	Cherry	Manitoba maple	Western snowberry
Balsam poplar	Elm	Sumac	Willow
Birch	Hazelnut	Trembling aspen popular	

Registered Tank Mixes

All formulations of 2,4-D may be recommended in tank mix with other products. Consult the label of the tank mix partner product, and follow the most stringent set of precautions, restrictions and directions for use.

Application Information

How to Apply: Ground and aerial applications.

Water Volume: Ground Applications: Barley, corn, rye and wheat: 20 – 40 L per acre. Established pasture and rangeland: 40 – 80 L/acre. Non-crop uses: 40 L/acre or more. **Turf:** 40 – 80 L/acre. Lawns and parks, sod farms, and golf courses: 40 – 80 L/acre. **Brush species:** 400 – 800 L/acre.

Aerial Applications: 22 – 66 L/acre. Some formulations of 2,4-D may be applied by air. Check the label for detailed instructions.

2,4D (cont'd)

Note: Higher application volumes reduced the risk of crop injury.

Nozzles and Pressure: Ground: flat fan nozzles (275 kPa). Low drift nozzles may require higher pressures.

Air: 235 kPa or less.

Application Tips

Recommendations vary from label to label; read label of product used. Do not use on sanfoin, bentgrasses, or freshly seeded grass. Spray during warm weather when the weeds are young and growing actively. Do not spray during periods of high temperatures (> 27°C) when crops may be under stress as damage to the crop may occur. Do not spray during periods of high winds when spray is likely to drift. Coarse sprays are less likely to drift.

How it works

Systemic, non-selective herbicide. Readily absorbed through leaves or roots. Translocated primarily in phloem with the sugars but can also move with water in the xylem. Accumulation is primarily in the young, rapidly growing meristematic regions of roots or shoots. It inhibits pigments, including chlorophyll, leading to death.

Expected results

Susceptible plants become malformed before they die.

Restrictions

Rainfall: 2,4-D amine: A rain-free period of 4 hrs is needed after application.

2,4-D ester: A rain-free period of 2 hrs is needed after application.

Grazing: Do not permit lactating dairy animals to graze fields within 7 days after application. Do not graze or cut treated crops for forage until 30 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter.

Re-cropping: No restrictions the year after treatment.

Restricted-entry Interval: Do not enter treated area within 12 hrs after application.

Environmental Hazards

Toxic to small mammals, birds, aquatic organisms and non-target terrestrial plants. **Leaching:** The use of this chemical may result in contamination of groundwater, particularly in areas where soils are permeable (e.g. sandy soil) and/or the depth to the water table is shallow. **Run-off:** To reduce runoff from treated areas into aquatic habitats, avoid application to areas with moderate to steep slope, bare soil, compacted soil, or clay.

Toxicity

Moderate acute mammalian toxicity. Acute oral LD₅₀ (rats) = technical 300 – 1200 mg/kg. 2,4-D formulations are toxic to small mammals, birds, aquatic organisms and non-target terrestrial plants. Observe buffer zones specified on the product label.

Storage

2,4-D amine requires heated storage. 2,4-D ester may be frozen.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.

Absolute

Manufacturer: BASF Canada

Group 2,4

Formulations

Product	Active ingredient	Formulation	Container size	Acres treated by one case
Odyssey (PCP# 25111)	Imazamox (35%) + imazethapyr (35%)	Water dispersible granules	4 packs per case: 2 x 86.5 grams per pack	40 acres
Lontrel Dry (PCP# 27306)	Clopyralid (75%)			

Safety information, see page 25

Absolute (cont'd)**Crops, Staging and Rates**

Crop	Stage	Rate
CLEARFIELD canola varieties	2 - 6 leaf stage	Odyssey: 17.3 g/acre
		Lontrel Dry: 80 g/acre
		Merge (adjuvant) 0.5% v/v or 0.5 L/100 L spray solution

Note: Merge is not supplied with the Absolute Pack

Weeds and Staging

Grasses: 1 - 4 true leaf stage, up to tillering

Broad leaves: cotyledons to 4 leaf stage

Grasses

Barnyard grass

Green foxtail

Persian dandelion

Volunteer barley

Volunteer oats

Volunteer wheat*

Wild oats

Broadleaves

Canada thistle (rosette to pre bud) (top growth control 6 - 8 weeks)

Chickweed

Cleavers (up to 4 whorls)

Flixweed

Hemp-nettle

Kochia (suppression)

Lamb's-quarters (suppression)

Redroot pigweed

Russian thistle

Shepherd's-purse

Smartweed

Stinkweed

Stork's-bill

Volunteer canola (non

CLEARFIELD varieties)

Volunteer tame mustard*

Wild buckwheat

Wild mustard

* Does not control volunteer Clearfield wheat, Clearfield XCEED.

Registered Tank Mixes: None

Application Information

How to Apply: Ground applications only. Do not apply by air.

Water Volume: 40 L per acre.

Nozzles: Flat fan nozzles are recommended, tilted 45 degrees forward for better penetration. **Pressure:** 275 kPa.

Application Tips

Water-soluble bags of Odyssey will dissolve better when kept intact; do not split bags. If agitation is stopped for more than 5 minutes, re-suspend spray solution by full agitation prior to commencing spraying again. Do not spray Absolute, if temperatures of +5°C or lower are forecasted within 3 days of application. Temperatures near freezing (below 5°C) will prevent optimum herbicide performance, as weeds are not actively growing. Treat CLEARFIELD canola during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of Canada thistle may be severely reduced. Sow thistle plants emerging after spraying will not be controlled.

How it Works

Odyssey is absorbed by foliage and roots and disrupts plant metabolism, causing growth to stop. Lontrel is a systemic hormone-type herbicide. It is absorbed by leaves and stem surfaces and is readily translocated. Maximum efficacy results from foliar applications to young, actively growing plants.

Expected Results

Odyssey: Susceptible weeds may stop growing within 24 - 48 hours. Yellowed growing points, yellow striping and purplish or reddish discolouration of the leaves may occur. Leaves begin to die in 3 - 10 days, starting with the youngest and moving to the older leaves. Death of the plant may occur in 1 - 3 weeks. Lontrel symptoms on affected plants include swollen growing points and roots, cupping of leaves, twisted and distorted stem. Plants will gradually stop growing and will change colour, first to dark green and then to yellow before turning brown as they die. Maximum effectiveness results from foliar application to young, actively growing plants. Death of weeds may not occur until 14 - 21 days after application. On Canada thistle, some re-growth may occur by the end of the season, but this will not interfere with harvesting of the crop.

Restrictions

Rainfall: A rain-free period of 4-6 hrs is needed after application.

Grazing: Do not graze treated crops or cut for hay; there are insufficient data to support such use. Apply Absolute only once per year.

Maximum Allowable Applications: Apply Absolute only once per year.

Pre-harvest Interval: 60 days

Re-cropping Restrictions: Barley, Clearfield canola, XCEED canola, corn, spring wheat (including durum), oats, can be grown safely the year following an application. Flax, canary seed, lentils, peas, non-Clearfield canola and sunflower can be grown in the second year after an Absolute application (e.g. if Absolute was applied in 2008 then non-Clearfield canola can be planted in 2010). For other crops, call BASF at 1-877-371-2273. Conduct a field bioassay (a test strip grown to maturity) the year before growing any crops other than those listed above. In case of crop failure, replant to Clearfield canola or Clearfield wheat only.

Environmental Hazards

Absolute is highly toxic to non-target plants. Leave a buffer zone of at least 14 m between the downwind point of direct application and the closest edge of sensitive terrestrial and aquatic habitats. To reduce runoff from treated areas into aquatic habitats, consider the characteristics and conditions of the site before treatment.

Toxicity

Odyssey: low acute mammalian toxicity. Acute oral LD_{50} (rats) = >5,000 mg/kg. Not toxic to birds, fish or beneficial insects such as bees. **Lontrel:** very low acute mammalian toxicity. Acute oral LC_{50} (rats) = >2,000 mg/kg. Acute oral LD_{50} (bees) 100 µg/bees. Extremely low toxicity to fish.

Storage

Store at temperatures above 5°C. Keep unused water-soluble bags in resealed, original containers. Keep package dry at all times. Store away from food, feed stuff, fertilizer and pesticide.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.

Accent (nicosulfuron)

Manufacturer: E.I. duPont Canada Inc.

Group 2

Formulations:

Product	Active ingredient	Formulation	Container size	Acres treated by one pouch
Accent (PCP# 25116)	Nicosulfuron (75%)	Water dispersible granules	133.5 gram (4 x 33.4 g water soluble bags)	10 acres

Crops, Staging and Rates

Crop	Stage	Rate
Field corn	1-8 leaves* (6 visible collars)	13.5 g/acre plus 0.2% v/v non-ionic surfactant (Citowett Plus, Agral 90 or Ag-Surf)
Sweet corn**	1-6 leaves* (4 visible collars)	

* The coleoptile (short, blunt leaf) is counted as the first leaf

** Accent is registered on all sweet corn varieties; however, tolerance may vary depending on variety. Refer to seed supplier for variety tolerance

Weeds and Staging

Weeds	Staging
Barnyard grass	1 - 6 leaves (up to 2 tillers)

Accent (cont'd)

Weeds	Staging
Fall panicum	1 - 6 leaves (up to 2 tillers)
Green foxtail	1 - 6 leaves (up to 2 tillers)
Old witchgrass	1 - 6 leaves (up to 2 tillers)
Quackgrass	3 - 6 leaf stage (10 to 20 cm in height - leaf extended)
Wild oats	3 - 6 leaves
Yellow foxtail (suppression)	1 - 6 leaves (up to 2 tillers)

* Does not control volunteer Clearfield wheat.

Registered Tank Mixes

Accent (13.5 g/acre) + Banvel II (0.24 L/acre) + 0.2% v/v non-ionic surfactant (Citowett Plus, Agral 90 or Ag-Surf).

Accent (13.5 g/acre) + Pardner (0.4 L/acre) + 0.2% v/v non-ionic surfactant (Citowett Plus, Agral 90 or Ag-Surf).

Application Information

How to Apply: Ground applications only. **Do not apply by air.**

Water Volume: 40 L per acre.

Nozzles: Flat fan nozzles types. **Pressure:** 175 - 275 kPa.

Application Tips

Warm, moist conditions following application promote the activity of Accent, while cool and/or dry conditions may reduce or delay activity. Poor weed control or crop injury may result from applications made to plants under stress from abnormally hot or cold weather, environmental conditions such as drought, water-saturated soils, hail damage or frost, disease, insect or nematode injury and prior herbicide, or carryover from a previous year's herbicide application. Delay application until stress passes and both weeds and corn resume growth. If corn has been injured by frost, wait 48-72 hours before applying Accent. Severe stress conditions immediately following application may also result in crop injury or poor weed control. Do not apply a foliar organophosphorus insecticide within 7 days before or after applying Accent.

How it Works

Accent is a systemic herbicide that is absorbed by the foliage and translocated to the growing points of the plant. Growth of susceptible plants stops shortly after application. Accent rapidly stops the growth of susceptible species; typical symptoms usually appear within 5 - 7 days, but may not be noticeable for 2 - 3 weeks after application, depending on the prevailing growing conditions.

Expected Results

Typical injury symptoms include yellowing, purpling and reddening of the newest leaves and usually appear within 5 - 7 days, but may not be noticeable for 2 - 3 weeks after application, depending upon the prevailing growing conditions. Eventually the entire plant discolours and dies.

Restrictions

Rainfall: A rain-free period of 2- 4 hrs is needed after application.

Grazing: Do not graze treated crops or cut for hay.

Pre-harvest Interval: Do not harvest field corn until 30 days and sweet corn for 40 days after application.

Re-cropping Restrictions: Winter wheat may be seeded 4 months after application. Barley, corn, spring wheat, white beans, red clover and alfalfa may be seeded one year after application. For all other crops a field bioassay is recommended before planting. Do not plant canola for 22 months following application. For all other crops including sugarbeets, a field bioassay is recommended before planting. Do not plant sugarbeet until a field bioassay indicates it is safe to do so.

Environmental Hazards

Accent is toxic to terrestrial plants and aquatic organisms. Leave a buffer zone of at least 14 m between the downwind point of direct application and the closest edge of sensitive terrestrial and aquatic habitats.

Toxicity

Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = >5,000 mg/kg.

Storage

Store in a dry place. Keep water-soluble bags in original outer container or bag away from moisture.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.

Achieve (Liquid Achieve SC)/ Bison 400L/Marengo

Manufacturer: Dow AgroSciences Inc/MANA Canada/Viterra

Group 1

Formulations

Product	Active ingredient	Formulation	Container size	Acres treated by 8 litres jug
Liquid Achieve SC (PCP# 28555)	400 g/L tralkoxydim	Suspension concentrate	2 x 8L or 96L jug	40 acres.
Bison 400L (PCP# 29256)	400 g/L tralkoxydim	Suspension concentrate	2 x 10L	
Marengo (PCP# 29289)	400 g/L tralkoxydim	Suspension concentrate	2 x 10 L	

Crops and Staging

No staging restrictions

Barley (all 2 or 6 rows) (8.9)	Winter wheat all varieties (8.9)	Triticale
Spring wheat (all varieties) (8.9)	Spring rye	
Durum wheat (all varieties) (8.9)	Fall rye	

Underseeded crops

Apply at 2 – 4 leaf stage of the forage legumes and grasses

Cereal crops underseeded to forage legumes (if not tank-mixed with broadleaf herbicides)

Alfalfa	Bird's-foot trefoil	Clover	Sainfoin
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Forage grasses underseeded to cereals or grown alone

Crested wheatgrass	Intermediate wheatgrass	Creeping red fescue	Meadow and smooth brome grass (seed production)
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Weeds controlled staging and rates

Weeds	Stage
Barnyard grass	1 – 4 leaf
Persian dandel	
Green foxtail	1 – 5 leaf
Yellow foxtail	
Volunteer oats	1 – 6 leaf
Wild oats	

Rate

200 mL per acre of Liquid Achieve/Bison 400L/Marengo. Add Turbocharge at a rate of 0.5% v/v or 0.5 L per 100 L spray solution. When water analysis indicates bicarbonates levels are 400 ppm or greater, add ammonium sulfate at 0.75 – 1.5 kg/100 L (7.5 – 15 lb/100 gallons) of spray water prior to mixing.

Achieve (Liquid Achieve SC)/Bison 400L/Marengo (cont'd)**Registered Tank Mixes**

For all tank mixes, use 0.2 litres Achieve SC/Bison 400L/Marengo plus the following:

Tank-mix partner	Product rates	Crop stage
2,4-D ester	400 mL/acre (600 g/L formulation)	Prior to the 4 leaf stage of the crop
Attain	Attain A: 240 mL/acre + Attain B: 400 mL/acre)	Prior to the 4 leaf stage of the crop
Buctril M	400 mL/acre	Apply between 2 leaf to early flag leaf
Curtail M	810 mL/acre	Apply between 3 leaf to early flag leaf
Dichlorprop plus 2,4-D ester	710 mL/acre	Prior to 4 leaf stage of the crop
Lontrel + MCPA ester	Lontrel: 110mL/acre + MCPA ester 500: 450 mL/acre	Apply between 3 leaf expanded to flag leaf
MCPA ester 500	450 mL/acre	Apply between 3 leaf to early flag leaf
Mextrol 450 M	450 mL/acre	Spring wheat (including durum) and barley: 2 leaf to early flag leaf
Mextrol 400	560 mL/acre	
Prestige	Prestige A: 320 mL/acre + Prestige B: 800 mL/acre	Spring wheat and barley: 3 leaf to early flag leaf
Trophy	Trophy A: 240 mL/acre + 450 mL/acre	Spring wheat (including durum) and barley: 3 leaf to early flag leaf
Thumper	400 mL/acre	Spring wheat (including durum) and barley: 4 leaf to early flag leaf
Decis Flowable (insecticide)	63 - 83 mL/acre	Spring wheat (including durum) and barley: 3 leaf to early flag leaf

Note: Do not tank mix with 2,4-D amine or MCPA amine formulation or with any other herbicide, insecticide, fungicide, fertilizer solution or adjuvant not recommended on the label as poor grass control and/or unacceptable crop injury may result.

Do not tank mix Liquid Achieve SC/Bison 400L/Marengo with broadleaf herbicides when applying to cereal crops underseeded to forage legumes as the forages may be injured or killed.

With reduced water volumes, tank mixes with Buctril M, Thumper or Pardner may result in some initial injury in the form of "tip burn." This injury, however, will not have any adverse effect on crop maturity or yield.

Tank mixes with Attain or Prestige may cause temporary crop injury if applied before the 4-leaf stage. These tank mixes may provide a lower level of wild oat control than Achieve SC/Bison 400L/Marengo alone.

Tank mixes with 2,4-D ester/dichlorprop and Buctril M plus MCPA may cause some injury in barley.

Application Information

How to Apply: Ground and aerial applications.

Water Volume: Ground: 20 - 40 L/acre. Air: 12 - 18 L/acre.

Nozzles: Flat fan nozzles types. **Pressure:** Ground: 275 kPa. Air: 140 - 275 kPa.

Application Tips

Weed Control: Optimum weed control is obtained by applying herbicides when targeted weeds are actively growing. Applying herbicides under stressful conditions (drought, heat, frost, poor soil fertility, flooding or prolonged cool temperature) may delay or reduce weed control.

Crop safety: Applications of Achieve SC/Bison 400L/Marengo to non-tillered crops exposed to 4°C temperatures before or after spraying should be avoided to prevent the possibility of crop injury. Tillered cereal crops may incur injury if Achieve SC is sprayed within 48 hours of freezing temperatures.

Sequential applications: Always apply Liquid Achieve SC/Bison 400L/Marengo first and allow 5 - 7 days before applying any other non-registered tank mix herbicide. This is especially critical for Group 2 herbicides.

How it Works

Tralkoxydim is a systemic herbicide that is absorbed through the leaves and translocated to the growing points within the plant where it inhibits an enzyme involved in lipid biosynthesis. Thorough coverage of the foliage is important for consistent grass control.

Safety information, see page 25

Expected Results

Grass growth stops in 48 hours. Young shoots turn brown in 7 - 8 days. Complete death of plant will take 2 - 3 weeks.

Restrictions

Effects of Rainfall: No effect 1 hour after application.

Grazing: Immature cereal crops may be grazed, harvested or cut for hay 16 days after treatment. Mature straw may be fed to livestock. Do not feed or graze underseeded forage crops in the year of treatment.

Pre-harvest Interval: Immature cereal crops may be grazed or cut for hay 16 days after treatment. Grain may be harvested 60 days after treatment. Mature straw may be fed to livestock. Do not feed or graze underseeded forage crops in the year of treatment, sufficient data are not available to support this use.

Re-cropping Restrictions: Do not replant treated areas to tame oats or corn for at least 4 weeks after application. Other Crops: none.

Environmental Hazards

Do not apply to any body of water. Avoid drifting of spray onto any body of water or other non-target. Do not apply within 15 m by ground and (50 m by air) of non-crop areas. This includes fish-bearing waters, wetlands (potholes, sloughs etc.) and wildlife habitat (hedgerows, rights of way, etc.).

Toxicity

Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) = >5,000 mg/kg.

Storage

Store in a cool, dry place. Keep packages dry at all times. Product is not affected by freezing.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.



Warning Poison

Achieve Liquid Gold

Manufacturer: Nufarm Agriculture Inc.

Group 1, 4, 6

Formulations

Product	Active ingredient	Formulation	Container size
Achieve SC (PCP# 27011)	400 g/L tralkoxydim	Suspension concentrate	4L, 90L
Mextrol 450 (PCP# 26999)	225 g/L bromoxynil + 225 g/L MCPA ester	EC	10L, 112.5L
Turbocharge (PCP# 23135)	50% mineral oil + 40% surfactant blend		4L, 90L

Acres treated by one package: 20 acres or 450 acres.

Crops and Staging

Wheat (including durum) and barley: 2 - leaf to early flag leaf; winter wheat, fall rye: from the time growth commences to early flag leaf

Barley (all 2 or 6 rows) (8.9)

Durum wheat (all varieties) (8.9)

Fall rye

Spring rye

Spring wheat (all varieties) (8.9)

Winter wheat all varieties (8.9)

Weeds controlled and staging

Grasses		
1 - 4 leaf stage	1 - 5 leaf stage	1 - 6 leaf stage
Barnyard grass (8.0)	Green foxtail (8.3)	Volunteer oats
Persian darnel (8.0)	Yellow foxtail	Wild oats (.3)

Achieve Liquid Gold (cont'd)

Grasses		
1 – 4 leaf stage	1 – 5 leaf stage	1 – 6 leaf stage
Broadleaves		
Seedlings up to 4 leaf stage		
American nightshade	Kochia**	Shepherd's-purse
Ball mustard	Lady's-thumb	Stinkweed
Bluebur	Night flowering catchfly	Velvetleaf****
Cocklebur	Pale smartweed	Volunteer rapeseed
Cow cockle* (7.8)	Redroot pigweed	Volunteer sunflower
Flixweed (5.7)	Russian thistle**	
Green smartweed	Scentless chamomile***	
Seedlings up to 8 leaf stage		
Common buckwheat	Lamb's-quarters	Wild buckwheat
Common groundsel	Stinkweed	Wild mustard
Common ragweed	Tartary buckwheat	Wormseed mustard
Perennial: top growth control		
Canada thistle	Perennial sow-thistle	

* In normal conditions cow cockle will be controlled up to the 4-leaf stage. Plants beyond this stage are unlikely to be controlled.

** Spray before plants are 5 cm high.

*** Spring annuals only.

**** Spray before plants are 8 cm high.

Rate

Achieve Liquid SC: 0.2 L/acre. **Mextrol 450:** 0.5 L/acre. **Turbocharge adjuvant:** 0.5% v/v or 0.5 L per 100 L spray solution. One case of Achieve Liquid Gold will treat 20 acres.

When water analysis indicates bicarbonates levels are 400 ppm or greater, add ammonium sulfate at 0.75 – 1.5 kg/100 L (7.5 – 15 lb/100 gallons) of spray water prior to mixing.

Registered Tank Mixes

Tank-mix partner	Product rates	Remarks
MCPA ester	0.22 L/acre (500 g/L formulation)	A reduction in green foxtail control may occur with this tank mix.
Decis	Label rates	
Matador	Label rates	

Application Information

How to Apply: Ground and aerial applications.

Water Volume: Ground application: 20 – 40 L/acre. **Aerial application:** 12 – 18 L/acre.

Nozzles: Flat fan nozzles types. **Pressure:** Ground application: 275 kPa. **Aerial application:** 140 – 275 kPa.

Application Tips

Weed Control: Optimum weed control is obtained by applying herbicides when targeted weeds are actively growing. Applying herbicides under stressful conditions (drought, heat, frost, poor soil fertility, flooding or prolonged cool temperature) may delay or reduce weed control.

Crop safety: Applications of Achieve Liquid Gold to non-tillered crops exposed to 4°C temperatures before or after spraying should be avoided to prevent the possibility of crop injury. Tillered cereal crops may incur injury if Achieve Liquid Gold is sprayed within 48 hours of freezing temperatures.

How it Works

Achieve is a systemic herbicide that is absorbed through the leaves and translocated to the growing points within the plant where it starts killing the susceptible grasses. Thorough coverage of the foliage is important for consistent grass control. Mextrol 450 contains two components, bromoxynil and MCPA. Bromoxynil is a contact herbicide inhibiting respiration and photosynthesis of the susceptible weeds. MCPA is a systemic herbicide absorbed through foliage and roots and is readily translocated to the actively growing regions of the plant.

Expected Results

Grassy weeds: growth stops in 48 hours. Young shoots turn brown in 7 - 8 days. Complete death of plant will take 2 - 3 weeks. Broadleaf weeds: small burnt spots on the leaf can appear within hours; death takes up to two weeks. Poor results may be expected as a result of poor coverage or poor penetration through canopy.

Restrictions:

Effects of Rainfall: No effect 1 hour after application.

Grazing: Immature cereal crops may be grazed, harvested or cut for hay 16 days after treatment. Mature straw may be fed to livestock. Do not feed or graze underseeded forage crops in the year of treatment.

Pre-harvest Interval: Immature cereal crops may be grazed or cut for hay 16 days after treatment. Grain may be harvested 60 days after treatment. Mature straw may be fed to livestock. Do not feed or graze underseeded forage crops in the year of treatment, sufficient data are not available to support this use.

Re-cropping Restrictions: Do not replant treated areas to tame oats or corn for at least 4 weeks after application. Other Crops: none.

Environmental Hazards

Do not apply to any body of water. Avoid drifting of spray onto any body of water or other non-target. Do not apply within 15 m by ground and (50 m by air) of non-crop areas. This includes fish-bearing waters, wetlands (potholes, sloughs etc.) and wildlife habitat (hedgerows, rights of way, etc.).

Toxicity

Achieve Liquid: very low acute mammalian toxicity. Acute oral LD_{50} (rats) = 2,950 mg/kg. Acute dermal LD_{50} (rats) = >5,000 mg/kg.

Mextrol 450: high acute mammalian toxicity. Acute oral LD_{50} (rats) = 365 mg/kg. Very toxic to birds and fish. Non-toxic to bees. May cause burns and may be absorbed through the skin.

Storage

Store in a cool, dry place, away from children, animals, food, feed or fertilizers. Keep unused product in resealed original container. Store above -5°C. Shake well before reuse.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.

Adrenalin SC

Manufacturer: BASF

Group 2, 4

Formulations

Product	Active ingredient	Formulation	Container size
Adrenalin SC (PCP# 27879)	Imazamox (20 g/L) + 2,4-D (600 g/L)	Emulsifiable concentrate	2 x 8 L jugs

Crops and Staging

Apply only to CLEARFIELD wheat (Wheat varieties with the CLEARFIELD trait). Application should be made from the leaf up to and including the 6 leaf stage of CLEARFIELD wheat prior to flag leaf emergence.

Note: Initial crop injury may be observed after application but this is outgrown and should not affect yield. Severe crop injury may occur as a result of spray overlap. **Avoid sprayer overlap.**

Adrenalin SC (cont'd)**Weeds controlled and staging**

Grasses: 1 – 4 leaf stage up until early tillering (maximum of two tillers)

Broadleaves: Cotyledons to 4 leaf stage

Grasses

Barnyard grass
Green foxtail
Persian darnel

Volunteer barley
Volunteer canaryseed
Volunteer durum wheat

Volunteer tame oats
Volunteer wheat (non-imazamox tolerant)

Wild oats
Yellow foxtail

Broadleaves

Annual smartweed
Annual sow-thistle
Bluebur
Cocklebur
Cow cockle
Daisy fleabane
False flax
Flixweed

Goat's-beard
Kochia
Lamb's-quarters
Mustards (except dog and tansy)
Narrow-leaved hawk's-beard
Plantain
Prickly lettuce

Ragweed
Redroot pigweed
Russian thistle
Shepherd's-purse
Stinging nettle
Stinkweed
Sweet clover
Thyme-leaved spurge

Volunteer canola (including all HT varieties)
Wild buckwheat
Wild radish
Wild sunflower

Suppression and/or top growth control

Biennial wormwood
Blue lettuce
Bull thistle*
Burdock*
Buttercup*
Canada thistle*
Chickweed
Cleavers
Common groundsel

Curled dock (young)
Dandelion
Field bindweed*
Gumweed
Hawkweed
Heal-all
Hedge bindweed
Hemp-nettle
Hoary cress*

Horsetail
Japanese Bromegrass
Knotweed
Leafy spurge
Mustard (dog and tansy)
Oak-leaved goosefoot
Peppergrass
Perennial sow-thistle*
Pineappleweed

Prostrate pigweed
Purslane
Russian knapweed
Sheep sorrel
Tartary buckwheat*
Tumble pigweed
Velvetleaf
Yellow rocket

* Top growth control only

Rates

Adrenalin SC: 0.4 L/acre.

Non-ionic surfactant (e.g., Agral 90, Ag Surf or Surf 92): 0.25% v/v or 0.25 L per 100 L of spray solution. Surfactant is not included in the Adrenalin SC case.

Registered Tank Mixes: None

Application Information

How to Apply: Ground applications only. **Do not apply by air.**

Water Volume: Ground: 40 L/acre.

Nozzles: No nozzle preference is indicated on the label. **Pressure:** 275 kPa.

Application tips

Crop safety: Initial crop injury may be observed after application but this is outgrown and should not affect yield. Severe crop injury may occur as a result of spray overlap. **Avoid sprayer overlap.** If application of Adrenalin SC is early (prior to 3 leaf stage), there may be 2,4-D damage. Application prior to the 3-leaf stage of wheat may cause severe twisting of leaves and leaf stem and head deformities, which may reduce yield. Do not spray Adrenalin SC if temperatures of +5°C or lower are forecasted within 3 days of application. Temperatures near freezing (below 5°C) will prevent optimum herbicide performance, as weeds are not actively growing.

Weed Control: Treat CLEARFIELD wheat during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of some weeds may be severely reduced. Application must be made before crop canopy shields the weeds.

How it Works

Absorbed by foliage and roots. Disrupts plant metabolism causing growth to stop. Works best under good growing conditions.

Expected Results

Grassy weeds will stop growing within 24 hours of application. After 7 - 10 days, symptoms start occurring. There is a definite yellowing of the growing point; interveinal chlorosis and newest leaves are noticeably affected by yellowing. Death occurs for grassy weeds in 14 - 21 days. Broadleaf weeds stop growing within 24 hours and weed

Adrenalin SC (cont'd)

activity stops within 1 - 5 days. There will be a twisting of the growing point (result of the 2,4-D component) and yellowing of the growing point (result of the imazamox).

Restrictions:

Effects of Rainfall: Do not apply Adrenalin SC if heavy rain is forecast.

Grazing: Do not graze the treated crop within 14 days of application or cut for hay within 42 days of application.

Pre-harvest Interval: Wheat grain and straw can be harvested 79 days after treatment.

Restricted-entry interval: 12 hours.

Re-cropping Restrictions: Spring wheat (including durum), spring barley, canaryseed, corn, chickpeas, field peas, canola (all varieties), lentils, oats and flax can be grown safely the year following an application. Mustard (condiment type only) may be grown safely the second season after application. There are insufficient data for following with other crops. Conduct a field bioassay (a test strip grown to maturity) the year before growing any crops other than those listed above.

Environmental Hazards

Toxic to small mammals, birds, aquatic organisms and non-target terrestrial plants. Avoid situations that may result in drift. Leave 11 meters from the point of direct application and the closest downwind edge of sensitive terrestrial habitats (such as grasslands, forested areas, shelter belts, woodlots, hedgerows, pastures, rangelands, and shrublands) and sensitive aquatic habitats (such as lakes, rivers, sloughs, ponds, prairie potholes, creeks, marshes, streams, reservoirs, and wetlands). Do not spray exposed roots of trees and ornamentals.

Leaching: The use of Adrenalin SC may result in contamination of groundwater particularly in areas where soils are permeable (e.g. sandy soil) and/or depth to the water table is shallow.

Runoff: To reduce runoff from treated areas into aquatic habitats avoid application to areas with moderate to steep slope, compacted soil, or clay. Contamination of aquatic areas as a result of runoff may be reduced by including a strip of untreated vegetation between the treated area and the edge of the water body.

Toxicity

Imazamox: Low acute mammalian toxicity. The LD₅₀ (oral) for Adrenalin SC is >500 to <2,000 mg/kg.

Storage

Store above 5°C. Store in a cool, dry place away from children, animals, food, feed or fertilizers. Keep from freezing.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.



Caution Poison

Ally Toss-N-Go/Accurate

Manufacturer: E.I. DuPont Canada Inc./Chemnova Canada Inc.

Group 2

Formulations

Product	Active ingredient	Formulation	Container size	Acres treated by one package
Ally Toss-N-Go (PCP# 24388)	Metsulfuron methyl (60%)	Water dispersible granules	122 g package: (4 x 30.5) water soluble bags	40 - 60 acres
Accurate (PCP# 29242)	Metsulfuron methyl (60%)	Dry Flowable solid	120 gm package	

Ally Toss-N-Go/Accurate (cont'd)**Crops and Staging**

Crop	Rate	Stage
Barley	Up to 3 g/acre + non-ionic surfactant	2 leaf to the emergence of the flag leaf
Spring wheat (including durum)		
Forage grasses for forage or seed production		
Creeping red fescue	Up to 3 g/acre + non-ionic surfactant	2 leaf to the emergence of the flag leaf
Orchard grass		
Wheatgrass (crested and intermediate)		
Pasture and rangeland		
	10 – 12 g/ acre + non-ionic surfactant	

Weeds controlled and staging

Weeds must be actively growing at the time of application, unless otherwise indicated.

Ball mustard	Hemp-nettle (8.8)	Scentless chamomile (8.3)	Tartary buckwheat (8.3)
Bluebur (7.8)	Kochia* (8.0)	Shepherd's-purse (8.8)	Toadflax (suppression)
Canada thistle (suppression)**	Lady's-thumb (8.5)	Sow thistle (annual)	Volunteer canola (excluding CLEARFIELD canola)
Chickweed* (8.9)	Lamb's-quarters	(suppression)**	Wild buckwheat
Common groundsel (8.6)	(suppression)****	Sow thistle (perennial)	(suppression)***
Corn spurry (8.1)	Prostrate pigweed (7.3)	(suppression)**	Wild mustard (8.8)
Cow cockle	Redroot pigweed	Stinkweed (8.8)	
Flixweed (6.6)	Russian thistle (suppression)****	Stork's-bill (7.7)	
Green smartweed (7.2)			

* Excluding group 2 resistant populations

** Before the thistle are more than 15 cm tall.

*** Cotyledon to 3-leaf stage.

**** Before these weeds are more than 8 cm tall.

Ally/Accurate 2 grams/acre + 2,4-D (amine or ester) + non-ionic surfactant

Annual sunflower	Green smartweed (8.6)	Redroot pigweed (8.3)	Stinkweed (8.2)
Ball mustard	Hemp-nettle (8.4)	Russian pigweed	Stork's bill*
Bluebur*	Kochia (7.4)	Russian thistle (7.7)	Sweetclover
Canada thistle	Lady's-thumb*	Scentless chamomile*	Tartary buckwheat*
Chickweed	Lamb's-quarters	Shepherd's-purse (6.2)	Toadflax (suppression)
Common groundsel*	Narrow-leaved hawk-beard**	Sow thistle (annual)	Volunteer canola (including CLEARFIELD varieties)
Corn spurry*	Plantain	(suppression)	
Cow cockle (8.6)	Prickly lettuce	Sow thistle (perennial)	
Flixweed (9)	Prostrate pigweed	(suppress)	

* Weeds controlled only when Ally + 2,4-D mixture contains Ally Toss-N-Go at 3.0 grams/acre.

** Spring seedling only

Ally/Accurate 2 grams/acre + MCPA (amine or ester) + non-ionic surfactant

Annual sunflower	Flixweed (7.6)	Prostrate pigweed*	Stork's bill*
Ball mustard	Green smartweed (8.5)	Redroot pigweed (8.0)	Sweetclover
Bluebur*	Hemp-nettle (8.5)	Russian pigweed	Tartary buckwheat*
Canada thistle	Kochia (6.7)	Russian thistle (8.0)	Toadflax (suppression)
Chickweed (8.6)	Lady's-thumb*	Scentless chamomile*	Volunteer canola (including CLEARFIELD varieties)
Common groundsel*	Lamb's-quarters	Shepherd's-purse (7.6)	Wild mustard (8.7)
Corn spurry*	Plantain	Stinkweed (8.6)	Wormseed mustard
Cow cockle (8.7)	Prickly lettuce	Stinkweed (8.2)	

* Weeds controlled only when Ally/Accurate + MCPA mixture contains Ally Toss-N-Go/Accurate at 3.0 grams/acre.

** Spring seedling only

Rate

Cereals and forage grasses (for forage or seed production) – up to 3 grams/acre plus recommended surfactant (Agral 90, AgSurf or Citowett Plus, Companion, Super Spreader - Stricker) at 0.2 L/100 L of spray solution.

Pasture and rangeland: Western snowberry: 10 grams/acre. **Wild rose:** 12 grams/acre. Add a recommended surfactant (Agral 90, AgSurf or Citowett Plus, Companion, Super Spreader - Stricker) at 0.2 L/100 L of spray solution.

Tank Mixture

Tank-mix partners	Product rate	Crop stage	Remarks
In spring wheat (including durum) and barley			
2,4-D 600 ester	0.28 – 0.36 L/acre	Full 3 leaf to just before flag leaf	Add recommended non-ionic surfactant
MCPA 500 amine or ester	0.28 – 0.36 L/acre	Full 3 leaf to just before flag leaf	Add recommended non-ionic surfactant
Avenge	1.7 L/acre	2 – 6 leaf (shot blade)	No surfactant is required
Avenge + MCPA ester	1.7 – 0.28 + 0.36 L/acre	2 – 6 leaf (shot blade)	No surfactant is required
Spring wheat (including durum)			
Puma¹²⁰ Super	0.15 – 0.31 L/acre	2 leaf to 6 leaf (main stem) + 3 tillers	No surfactant is required
Spring wheat only			
Horizon + Score adjuvant	92 – 117 mL/acre	2 leaf to flag leaf	Add Score adjuvant at 0.8 – 1.0 % v/v
Established creeping red fescue for seed			
Assure + Score adjuvant	0.4 – 0.6 L/acre	2 leaf to flag leaf	Add Score at 0.5% v/v

Application Information

How to Apply: Ground applications only. **Do not apply by air.**

Water Volume: Cereal and forage grasses: 40 L/acre. Pasture and rangeland: 40 – 91 L/acre. **Do not apply by air.**

Nozzles: Flat fan type, 50 mesh or larger screens. Only metal or nylon filters. **Pressure:** 275 kPa.

Application tips

Effectiveness may be reduced if spray mixture remained in tank for more than 48 hrs. Warm, moist growing conditions promote active weed growth and enhance the activity of Ally/Accurate, allowing maximum foliar uptake and contact activity. If cold, dry conditions prevail, delay treatment until active weed growth resumes. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur.

How it Works

Ally/Accurate is absorbed by the foliage and roots, readily translocated throughout the plant and inhibits the cell division.

Expected Results

Ally/Accurate rapidly inhibits the growth of susceptible weeds; however, typical symptoms (discolouration) of dying weeds may not be noticeable for 1 to 3 weeks after application depending upon growing conditions and weed susceptibility. Degree of control and duration of effect depend on weed sensitivity, weed size, growing conditions, soil pH and spray coverage.

Restrictions

Effects of Rainfall: Heavy rainfall immediately before or after application may cause temporary lightening of crop. Rainfall within 2 hours of application may lessen degree of weed control.

Grazing: Wheat, barley or forage crops may be grazed by or fed to livestock any time after treatment.

Re-cropping Restrictions: Do not use on soils with pH greater than 7.9. Do not apply to irrigated land where tail water will be used to irrigate other cropland.

Crops for rotation	Soil pH	Minimum cropping interval* (months)	
		Black and grey wooded soils	Brown and dark brown soils
Alfalfa, peas and red clover	7.5 or lower	22	Field bioassay
Barley and durum wheat	7.9 or lower	10	10
Canary seed	6.9 or lower	48	48
	7.0 – 7.9	48	48

Ally Toss-N-Go/Accurate (cont'd)

Crops for rotation	Soil pH	Minimum cropping interval* (months)	
		Black and grey wooded soils	Brown and dark brown soils
Canola	6.9 or lower	10	22
	7.0 – 7.9	22	34
Flax	6.9 or lower	10	22
	7.0 – 7.9	34	34
Fescue	7.5 or lower	10	Field bioassay
Lentils	6.9 or lower	34	34
	7.0 – 7.9	48	48
Oats	6.9 or lower	10	10
	7.0 – 7.9	10	22
Yellow mustard	6.9 or lower	48	48
	7.0 – 7.9	48	48
All other crops	7.9 or lower	Field bioassay	Field bioassay

* If land has been treated with Ally/Accurate and Assert the same year or in successive years, seed only wheat, excluding durum, until a field bioassay demonstrates that other crops can be seeded. When recropping to broadleaf crops following an Ally application, extend the rotational interval by 1 year if rainfall was less than 130 mm in the Brown and Dark Brown Soil Zones or 250 mm in the Black and Grey Wooded Soil Zones in any year within the stated interval prior to planting.

Environmental Hazards

Highly toxic to non-target plants. Over spray or drift to important wildlife habitats such as shelterbelts, wetlands, sloughs or dry slough borders and woodlots should be avoided. Leave a 15-meter zone between the last spray swath and the edge of any of these habitats. Do not use on highly variable soils that have large gravelly or sandy areas, eroded knolls, or calcium deposits. Do not apply to irrigated land where tail water will be used to irrigate other cropland. Do not contaminate irrigation water. Do not apply within 15 meters of a body of water.

Runoff: Do not apply to frozen ground where surface runoff may occur.

Toxicity

Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = >5,000 mg/kg.

Storage

Store in a cool dry place.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.

Altitude FX

Caution Irritant Danger Poison

Manufacturer: BASF Canada

Group 2,4

Formulations

Product	Active ingredient	Formulation	Container size	Acres treated by one package
AC 299,263,120 AS (PCP# 26705)	120g/L of imazamox	Solution	1.34 L	20 acres
Starane (PCP# 24815)	180 g/L of fluroxypyr	EC	4.8 L	
MCPA ester 600 (PCP# 27802)	600 g/L of MCPA ester	EC	7.5 L	

Crops and Staging

CLEARFIELD wheat varieties only. Apply at 3-leaf (after appearance of first tiller) to a 6-leaf stage to ensure optimum crop tolerance.

Safety information, see page 25

Altitude FX (cont'd)

Weeds and Staging

Grasses: 1-4 true leaf stage up until early tillering (maximum 2 tillers).

Broadleaf weeds: Apply up to 4-leaf stage, unless otherwise indicated.

Grasses

Barnyard grass
Green foxtail
Japanese brome*

Persian dandelion
Volunteer barley
Volunteer canaryseed

Volunteer wheat (durum and
spring) - non CLEARFIELD
Volunteer tame oats

Wild oats
Yellow foxtail

Broadleaves

Annual sunflower
Chickweed
Cleavers (1-4 whorl)
Cocklebur
Common burdock
Common ragweed
Cow cockle

Flixweed
Green smartweed*
Hemp-nettle (2-6 leaf)
Kochia (incl. group 2
resistant biotype)
Lamb's-quarters

Mustard (except dog
and tansy)
Prickly lettuce
Red root pigweed
Shepherd's-purse
Stinkweed

Stork's-bill (1-8 leaf)*
Vetch
Volunteer canola (all varieties)
Volunteer flax (1 - 12 cm)
Wild buck wheat
Wild radish

* Suppression

Rates

Product	Rate	Remarks
AC 299,263,120 AS	67 mLs/acre	Note: Surfactant not included with Altitude FX
Starane	0.24 L/acre	
MCPA ester 600	0.38L/acre	
Non-ionic surfactant (Agral 90, Ag Surf or Surf 92)	0.25 L/100 L or 0.25% v/v of spray solution.	

Tank Mixture: Non-registered.

Application Information

How to Apply: Ground applications only. **Do not apply by air.**

Water Volume: 20 - 40 L/acre.

Nozzle: No nozzle preference indicated. Use a 50-mesh or coarse screen and filter system. **Nozzles:** maximum of 275 kPa.

Application Tips

Initial crop injury may be observed after application but this is outgrown and should not affect yield. Severe crop injury will occur as a result of spray overlap. Avoid sprayer overlap.

Do not spray Altitude FX if temperatures of +5°C or lower are forecasted within 3 days of application. Temperatures near freezing (below 5°C) will prevent optimum herbicide performance, as weeds are not actively growing. Do not apply more than once per year. For best results, treat CLEARFIELD wheat during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth.

How it Works

Absorbed through the foliage and roots. Disrupts plant metabolism causing growth to stop within 24 hours. Visible symptoms appear within 7-10 days and, depending on environmental conditions, weed death occurs within 14-21 days after application.

Restrictions

Rainfall: Do not apply when heavy rain is forecast.

Grazing: Do not graze or silage the treated crop within 14 days of application or cut for hay within 42 days of application.

Pre-harvest Interval: Wheat grain and straw can be harvested 79 days after treatment.

Re-cropping: The following crops may be grown safely the year following an application: field peas, field corn, canary seed, CLEARFIELD canola, non-CLEARFIELD canola, lentils, spring wheat, durum wheat, spring barley, sunflower, tame oats, flax, chickpea. The following crop may be grown safely two years following an application: mustard (condiment type only). There are insufficient data for other following crops. Conduct a field bioassay (a test strip grown to maturity) the year before growing any crop other than those listed above.

Altitude FX (cont'd)**Environmental Hazards**

These products are highly toxic to non-target plants. Avoid situations where drift may occur. Leave a 15-meter buffer zone between sprayed and sensitive areas such as ponds, wetlands, streams, woodlots and shelterbelts. AC 299,263,120 AS contains a petroleum distillate, which is moderately to highly toxic to aquatic organisms. Avoid contamination of aquatic systems during application. Do not contaminate these systems through direct application, disposal of waste or cleaning of equipment.

Toxicity

AC 299,263,120 AS: Low mammalian toxicity. Acute oral LD₅₀ (rats) = 5,000 mg/kg. Starane: has a low mammalian toxicity. Acute oral LD₅₀ (rats) = 3,738 mg/kg. MCPA ester 600: moderate acute mammalian toxicity. Acute oral LD₅₀ (rats) = 1,046 mg/kg. This product contains a petroleum distillate, which is moderately to highly toxic to aquatic organisms. Avoid contamination of aquatic systems during application.

Storage

Store above 5°C. Store in a cool, dry place away from children, animals, food, feed or fertilizers. Keep from freezing.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.



Caution Poison

Amitrol 240

Manufacturer: Nufarm Agriculture Inc.

Group 11

Formulations

Product	Active ingredient	Formulation	Container size
Amitrol (PCP# 25684)	Amitrol	231 g/L	10 L

Crops, Rates and Staging

Crops	Rate	Weeds controlled	Day to plant
Pre-seed: wheat, barley, canola*	1.7 L/acre	Dandelion, annual weeds	0 - 1
Pre-seed: corn and soybeans	3.3 - 6.7 L/acre	Quackgrass, Canada thistle, broadleaf and annual weeds	10 - 14 days
Pre-seed: white beans		Dandelion, annual weeds	
Pre-seed: field peas	1.7 L/acre	Dandelion, annual weeds	5 - 7
Post harvest	5.0 - 6.6 L/acre	Canada thistle, perennial sow-thistle	
Alfalfa renovation	1.7 - 3.4 L/acre	Alfalfa, dandelion, annual weeds	
Established shelterbelts	7.6 - 11.3	Canada thistle, cattails, dandelions, hoary cress, field horsetail, leafy spurge, milkweed, perennial sow thistle, poison ivy, quackgrass, toadflax	
Spot treatments for pasture and non-crop land	0.165 L in 25 L of water to treat 10 x 10 m. area		

* The Canola Council of Canada recommends that Amitrol 240 not be used prior to canola grown for export market.

Weeds, Rate and Staging:

Prior to seeding: Dandelion and annual weeds - apply 1.7 L/acre to actively growing weeds less than 10 cm tall. Do not cultivate for 10 - 14 days.

Post-harvest: Canada thistle, perennial sow-thistle - apply when thistles have 10 - 15 cm of new growth. Do not cultivate for 2 weeks after application. Do not replant any crops in the treated areas except soybean, corn, white bean, wheat, barley, canola, and field peas.

Apple orchards: Annual weeds, Canada thistle, dandelions, field horsetail, hoary cress, poison ivy, poison oak, perennial sow-thistle, quackgrass (suppression).

Shelterbelts: Annual weeds, Canada thistle, dandelions, poison ivy, poison oak, perennial sow-thistle, quackgrass (suppression).

Pasture and non-cropland (roadsides, fencerows, ditch banks):

Weeds	Rate	Application directions
Canada thistle, perennial sow-thistle	5.0 – 11.3 L/acre	Apply when most thistles are in the early bud to bloom stage. Do not cultivate for 3 weeks. Do not till infested areas during the fall or spring before treatments
Cattails	15 – 18.5 L/acre	Apply after catkins are fully formed and up to frost. Do not disturb sprayed plant. Do not apply where water will be used for irrigating, drinking or other domestic uses. Do not apply where water is not wholly confined to users property
Dandelions	1.7 – 5.0 L/acre	Treat when dandelions are young and actively growing. Tillage can occur 3 weeks after treatment but is not necessary.
Field horsetail	5 – 6.6 L/acre	Spray when horsetail is growing vigorously. Usually when 10-15 cm in height.
Hoary cress	7.5 – 11.0 L/acre	Spray during advanced rosette and bud stages. Treated area should not be mowed. If necessary re-treat with one half the original rate when re-sprouts are 10 to 15 cm tall.
Leafy spurge	15 – 18.5 L/acre	Spray between the advanced flowering and early seed development stage. Treated areas should not be mowed but may be plowed after top growth is bleached. Spot treat regrowth the following year.
Milkweed	7.5 – 11.0 L/acre	Treat in early summer when a majority of shoots have emerged. Spot treat any regrowth the following year.
Poison ivy, poison oaks	3.7 L/acre	Apply in 200 to 400 litres of water per acre as an overall spray or as a spot treatment. Apply anytime after foliage is fully developed in spring until plant begin to turn color in the fall. Spray thoroughly, wet leaves, stems and suckers to ground line.
Quackgrass	5.0 – 11.3 L/acre	Apply when quackgrass is 10 – 15 cm tall. For best results, cultivate 3 weeks after treatment.
Toadflax	7.5 – 11.0 L/acre	Treat during advanced rosette to prebud stage. Till 3 weeks after treatment, when top growth is bleached. Spot treat any regrowth the following year.

Application Information

How to Apply: Ground applications only. **Do not apply by air.**

Water Volume: Non-crop areas: 40 – 120 L/acre, Crop areas: 20 – 80 L/acre **Shelterbelts:** 40 – 120 L/acre

Nozzles: Flat fan type, 50 mesh or larger screens. Only metal or nylon filters. **Pressure:** 150 - 275 kPa.

Application tips

Avoid using rates greater than 8 L/ac during preplant application on light soils with low organic matter. Spray to point of runoff, complete coverage of weeds essential. For good control, complete coverage of weeds is essential. Under or around desirable plants or trees, avoid contact with foliage, green stems or fruit as severe injury or destruction may result. Use a hooded sprayer if necessary. Do not disturb or mow treated plants for 3 weeks after treatment. If no tillage is possible, then spot treat weed regrowth or respray at 1/2 original rate. Do not contaminate any body of water. Do not apply where water will be used for irrigating, drinking or other domestic use. Do not spray near sparks or open flame For best results, apply Amitrol 240 in the early morning or evening when the humidity is higher. Avoid application when daytime temperatures exceed 25°C or when air conditions are very dry.

How it Works

Systemic herbicide that inhibits chlorophyll production. Moves through foliar and root system.

Expected Results: Whitening begins in 7 - 14 days and plants die. Poor results may be expected if poor coverage, inadequate rate, plants over-mature or under drought stress or if tilled too soon after application.

Restrictions

Effects of Rainfall: Heavy rain within 6 - 8 hours reduces effectiveness.

Grazing Restrictions: Do not graze treated crops or weeds; sufficient data is not available to support such use.

Re-cropping Restrictions: Crops, other than those listed in a pre-seed application may be seeded 8 months after treatment with Amitrol 240.

Amitrol 240 (cont'd)**Environmental Hazards**

Do not contaminate any body of water. Use caution to prevent spray, spray mist, or vapours from drifting off target. Spray drift may cause damage to crops or vegetation.

Toxicity

Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) = technical amitrole >4,000 mg/kg, technical ammonium thiocyanate – carrier 764 mg/kg. May be irritating to skin and eyes. Non-toxic to fish and birds.

Caution: Possible human goitrogen. Do not apply on foraging bees.

Storage

Do not store near food or feeds. Store away from area where temperature could reach greater than 50°C.

Do not store below 4°C. No shelf life limitation. Do not freeze, however, if frozen, contents will crystallize – to re-suspend, warm to 27°C and agitate as necessary.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.



Caution Poison

Arsenal

Manufacturer: BASF Canada

Group 2

Formulations

Product	Active Ingredient	Formulation	Container size	Acres treated by 9.5 L jug
Arsenal (PCP# 23713)	Imazapyr	Aqueous solution	9.5 L	7.9

Note: This product is to be applied by licensed applicators only.

Crops

Non-crop/non-graze areas such as industrial sites or rail road ballast. Spot treatments for hydro, pipeline and rail rights-of-way; pipeline stations including well sites; battery stations and compressor or valve stations. Site preparation prior to planting white spruce seedlings in the Boreal Forest Region.

Weeds Controlled and Staging

Apply post-emergence to actively growing weeds

Annual grasses

Annual bluegrass

Foxtail spp.

Old Witchgrass

Annual broadleaves

Annual sow-thistle

Hemp-nettle

Pigweed spp.

Sow-thistle (annual)

Black medic

Kochia*

Pineappleweed

Stinkweed

Common groundsel (common)

Lamb's-quarters

Rough cinquefoil

Wild buckwheat

Fleabane spp.

Mustard spp.

Russian thistle

Biennials

Bull thistle

Burdock

Goat's-beard

Mullein spp.

Perennials

Bladder campion

Dog-strangling vine

Plantain spp.

Tufted vetch

Brome grass

Fescue spp.

Poison ivy

Wild grape

Canada bluegrass

Field bindweed

Quackgrass

Wild strawberry

Canada thistle

Milkweed

Sheep sorrel

Yellow Nutsedge

Clover spp.

Mouse-ear chickweed

Sulfur cinquefoil

Dandelion

Ox-eye daisy

Toadflax

Woody species (seedlings)

Maple

Poplar

Raspberry

Wild rose

Prior to planting spruce seedlings

Aspen

Bluejoint reedgrass

* Note: Prairie-wide surveys of kochia fields have found approximately 90% of kochia populations that are Group 2 herbicide resistant. Without testing to confirm, assume the kochia in your field is resistant and will not be controlled by this product alone.

Safety information, see page 25

Rate: 1.21 L/ac. For small areas apply 30 mL per 100 m².

Registered Tank Mixes: None

Application Information

How to Apply: Ground applications only. **Do not apply by air.**

Water Volume: 40 – 223 L/acre.

Nozzles: Select proper nozzles to avoid spraying a fine mist. Recommended nozzle tips include: Spraying Systems 1503E, 1504E, 1506E, 2003E, 2004E, 4003E or 4004E Flat Fan Tip; Spraying Systems 5500X-3 or X-4 Adjustable Cone Tip; Spraying Systems 5780 Cone Tip (attached to a Model 43L Gunjet or comparable applicator). **Pressure:** 175 - 425 kPa.

Application Tips

Apply in sufficient water (40 - 223 L/ac) to wet all foliage during periods of active growth. Do not mix or store in unlined steel (except stainless steel) containers or spray tanks. Do not use where roots from desirable vegetation may extend into the treated area. Maintain a distance from desirable trees equal to at least twice the distance from the trunk to the drip-line. Do not apply where runoff water may flow onto agricultural land.

How it Works

Absorbed by both roots and foliage of sensitive vegetation. Translocated throughout the plant including the root system in both the xylem and the phloem. Non-selective. Plant stops growing shortly after application.

Expected Results

Plants stop growing within 24 - 48 hours. Yellow, purplish and/or red discolouration of the leaves may occur. The growing point of the plant and the youngest leaves begin to die first, with symptoms eventually progressing to older leaves. Chlorosis and tissue necrosis may not be apparent in some plant species until 2 weeks after application. Complete kill of plants may not occur for several weeks.

Restrictions

Effects of Rainfall: Rainfall within 2 hours may decrease foliar activity. Rainfall does not affect root activity or the control of non-emerged sensitive species.

Grazing restrictions: Do not graze the treated area or cut for hay.

Re-cropping Restrictions: Non-crop/non-graze applications only.

Environmental Hazards

Arsenal is toxic to non-target aquatic and terrestrial plants. Leave 20 meters from the downward edge of the spray boom to sensitive terrestrial habitats. (Buffer zones for protection of terrestrial habitats are not required for use on rights-of-way, including railroad ballast, rail and hydro rights-of-way, utility easements and roads). Do not apply where runoff water may flow onto agricultural land as injury to crops may result.

Toxicity

Low acute mammalian toxicity. Acute oral LD₅₀ (rats) 5,000 mg/kg. Non-toxic to fish, birds and bees.

Storage

Store above -12°C. Arsenal should not be mixed or stored in unlined steel (except stainless steel) containers or spray tanks.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.

Assert 300 SC



Caution Poison

Manufacturer: Nufarm Agriculture Inc.

Group 2

Formulations

Product	Company	Active ingredient	Formulation	Container size
Assert 300	Nufarm Agriculture Inc.	Imazamethabenz-methyl	SC	2 x 10.8 L jug
Acidulate (pH adjuster)	Nufarm Agriculture Inc.	Sodium bisulfate	WSG	2 x 2.5 kg bags

Crops and Staging

Crops	Recommended stage
Spring and durum wheat (8.3)	Up to and including 6 leaf stage before the flag leaf
Barley (8.5)	Up to and including 6 leaf stage before the flag leaf
Annual ryegrass (seed production only) (8.5)	4 – 6 leaf stage
Sunflower	2 – 8 leaf stage. Crop must be 30 cm tall except semi-dwarf varieties, which must be less than 10 cm tall.

Note: Sunflower Rate: 0.34 L/acre.

Weeds Rates and Staging

Weeds controlled	Staging	Rates	Acres to treat per 10.8 L jug
Wild oats (7.8)	1 – 3 leaf stage	0.54 L /acre	20 acres
Wild oats	4 leaf stage	0.67 L/acre	16 acres
Wild mustard	Cotyledons – 6 leaf stage	0.34 L/acre	32 acres
Stinkweed	Cotyledons – 6 leaf stage	0.34 L/acre	
Wild buckwheat* (3.5)	Cotyledons – 4 leaf stage	0.54 L /acre	20 acres
Tartary buckwheat* (5.4)	Cotyledons – 4 leaf stage	0.54 L /acre	

* Suppression only

Tank Mixes

Tank-mix partners	Product rate	Remarks
In spring wheat (including durum) and barley		
2,4-D LV ester*	Up to 0.32 L/acre (700g/L formulation)	Black and Grey Wooded soil zones: tank-mix Assert @ 0.67 L/acre. Brown and Dark Brown soil zones: tank-mix Assert @ 0.54 L/acre, if the majority of wild oats are in the 1-3 leaf stage: 0.67 L/acre of Assert if wild oats are in the 4-leaf stage.
Attain**	Attain A: 0.24 L/acre + Attain B: 0.40L/acre	
Curtail M**	0.81 L/acre	
Estoprop*	0.70 L/acre	
Express Pack**	Express (4 g/acre) + 2,4-D LV 700 (0.24 L/acre)	
Frontline**	Frontline A (0.04 L/acre) + Frontline B (0.34 L/acre + pH adjuster (0.25% V/V))	
Infinity**	0.336 L/ac	

Tank-mix partners	Product rate l	Remarks
In spring wheat (including durum) and barley		
MCPA ester*	Up to 0.38 L/acre (600g/L formulation)	Black and grey wooded soil zones: tank-mix Assert @ 0.67 L/acre. Brown and dark brown soil zones: tank-mix Assert @ 0.54 L/acre, if the majority of wild oats are in the 1-3 leaf stage; 0.67 L/acre of Assert if wild oats are in the 4-leaf stage.
Prestige**	Prestige A (0.32 L/acre) + Prestige B (0.81 L/acre)	
Puma 120 Super	0.12 L/acre	
Puma 120 Super + MCPA	0.12 L/acre + 0.28 L/acre	
Puma 120 Super + Refine Extra	0.12 L/acre + 6 g/acre	
Refine Extra**	8 g/acre	
Refine Extra + MCPA**	8 g/acre + 0.24 – 0.38 L/acre (600 g/L formulation)	
Spectrum**	Spectrum A (0.04 L/acre) + Spectrum B (0.51 L/acre) + pH adjuster (0.25% V/V)	
Trophy**	Trophy A (0.24 L/acre) + Trophy B (0.45 L/acre + pH adjuster ((0.25% V/V)	
Unity**	Unity 75 WG (4.5 g/acre) + Unity EC (0.2 L/acre)	
In spring wheat (including durum) only		
Turboprop 600**	0.7 L/acre	All soil zones: Assert @ 0.54 L/acre

* Use a spray volume of 20 – 40 L/acre

** Use a spray volume of 40 L/acre

Application Information

How to Apply: Ground applications only. **Do not apply by air.**

Water Volume: Cereals: 20 – 40 L/acre. Note: Use Assert with pH adjuster (one bag per 10.8 L jug) or poor weed control may occur. For ground driven pump systems, ensure spray water pH adjuster is dissolved before engaging pump.

Nozzles: Only 80° and 110° flat fan recommended. **Pressure:** 275 kPa.

Application Tips

Do not apply Assert within 5 days of any herbicide that is not a registered tank mix. Do not make more than one application of Assert per growing season. Do not apply Assert to the same field in two successive years. Do not spray Assert when freezing temperatures are forecast.

How it Works

Absorbed by foliage and roots and translocated to the growing points in the plant. Disrupts plant metabolism, causing growth to stop in susceptible plants. Works best at warm temperatures. Do not apply to drought-stressed sunflower.

Expected Results

Absorbed through the foliage and roots of wild oats, wild mustard and stinkweed, wild buckwheat, and tartary buckwheat plants. Susceptible plants stop growing soon after spray application. Obvious signs of plant death may not be seen in some plants until 2 weeks later but the competitive effect of these plants will have been removed. Death may not occur for several weeks.

Restrictions

Effect of Rainfall: Do not apply if rain is predicted within 6 hours.

Grazing: Do not graze treated fields or cut treated forage for silage or hay; sufficient data are not available to support such use. (Barley, wheat grain or straw from fields treated with Assert can be fed to livestock.)

Re-cropping: Rotation to the following crops can be made. **One-year after application:**

Black and Grey Wooded soil zones: spring wheat, durum wheat, barley, sunflower, canola, flax, peas.

Brown and Dark Brown soil zones: spring wheat, durum wheat, barley, sunflower, and CLEARFIELD canola.

Two years after the application: Following crops can be grown in all soil zones: spring wheat, durum wheat, barley, sunflower, peas, canola, flax, oats, canary grass. Conduct a field bioassay before planting lentils and sugar beets.

Assert 300 SC (cont'd)

Note: The additive effect of soil residues from the use of Assert and Ally, Curtail M, Unity and Prestige on the same land has not been determined. Crop rotation guidelines and minimum rotation intervals are not known and injury to rotational crops other than wheat (excluding durum) may occur. Where these herbicides have been used, plant only wheat (excluding durum) until a bioassay demonstrates that other crops can be successfully grown.

Environmental Hazards

Avoid application of Assert within 15 meters of water bodies (lake, pond, slough, streams, rivers).

Toxicity

Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = 3,078 mg/kg. Non-toxic to fish, birds, and bees.

Storage

Store between 0° - 35° C. Do not freeze. Shake well before using.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.



Caution Poison

Assert FL

Manufacturer: Nufarm Agriculture Inc.

Group 2

Formulations

Product	Company	Active ingredient	Formulation	Container size
Assert 300 (PCP# 21032)	Nufarm Agriculture Inc.	Imazamethabenz-methyl	SC	13.5 L
Frontline A (PCP# 27029)	Dow AgroSciences	Florasulam	EC	0.8 L
Frontline B (PCB # 27030)	Dow AgroSciences	MCPA	EC	5.61 L
PH adjuster	Nufarm Agriculture Inc.	Sodium bisulfate	WSG	3.12 kg

Crops and Staging

Crops	Staging	Rate and acres to treat per package
Barley	2 - 6 leaf stage	Assert: 0.67 L/acre; Frontline A: 40mL/acre; Frontline B: 0.28 L/acre. One case of Assert FL treats 20 acres.
Spring and durum wheat	2 - 6 leaf stage	

Weeds and Staging

annual sunflower	common ragweed	perennial sow thistle**	stinkweed
annual sow thistle**	dandelion** (seedlings and overwinter rosettes, < 15 cm)	plantain (top growth)**	stork's-bill**
ball mustard		prickly lettuce	volunteer canola*
burdock	flixweed	redroot pigweed	wild buckwheat
Canada thistle**	hemp-nettle	Russian pigweed	wild mustard
cleavers	kochia	shepherd's-purse	wild oats
common chickweed	lamb's-quarters	smartweed	

*Including all herbicide tolerant varieties

**Weeds suppressed

Note: broadleaf weeds controlled up to 4 leaf stage, wild oats controlled up to 6 leaf stage.

Registered Tank Mixes: None

Application Information

How to Apply: Ground only.

Water Volume: 20 - 40 L/acre. Note: Use Assert FL with pH adjuster (one bag per 10.8 L jug) or poor weed control may occur. For ground driven pump systems, ensure spray water pH adjuster is dissolved before engaging pump.

Nozzles: Only 80° and 110° flat fan recommended. **Pressure:** 275 kPa.

Safety information, see page 25

Application Tips

Do not apply to crops underseeded to legumes. Apply Assert FL early post-emergence to the main flush of weeds. Warm, moist conditions that promote active weed growth, small weed size, competitive crop and good growing conditions after application will optimize the weed control. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed, and regrowth may occur. For best results, ensure adequate spray coverage of the target weeds. Only weeds that have emerged at time of application will be controlled. If the foliage of the weed is wet at the time of application, control may be reduced.

How it Works

Assert is absorbed by foliage and roots and translocated to the growing points in the plants. Disrupts plant metabolism causing growth to stop in susceptible plants. Frontline tank mix is readily absorbed by the weed foliage. The florasulam inhibits the ALS enzyme in plants, resulting in a rapid halt in growth followed by yellowing and reddening of the foliage, followed by death of susceptible weeds. The MCPA portions of Frontline mimic the naturally occurring plant hormones and control the weeds by disrupting normal plant growth patterns.

Expected Results

Wild oats: Stop growing within 24 - 48 hours. Yellow striping and purplish discoloration of the leaf may occur. Leaves begin to die in 3 - 10 days, starting with the youngest and moving to the older leaves. Death of the plant may occur in 1 - 3 weeks. Symptoms may occur more slowly at lower temperatures and high rainfall. **Broadleaf weeds:** Weeds susceptible to the Frontline tankmix will stop growing almost immediately. The weeds turn yellow or reddish. Symptoms such as yellowing and red colouration may not be noticeable for 1 - 2 weeks. Some twisting may also be observed on weeds. Warm, moist conditions, small weed size and competitive crop will optimize weed control provided.

Restrictions

Effect of Rainfall: Heavy rainfall immediately after application may wash the chemical off the foliage, and a repeat treatment may be required. Do not apply if rainfall is forecast for the time of application.

Grazing: Do not graze treated fields or cut treated forage for silage or hay; sufficient data are not available to support such use. (Barley, wheat grain or straw from fields treated with Assert FL can be fed to livestock.)

Re-cropping: Rotation to the following crops can be made. **One-year after application:**

Black and Grey Wooded soil zones: spring wheat, durum wheat, barley, sunflower, canola, flax, peas.

Brown and Dark Brown soil zones: spring wheat, durum wheat, barley, sunflower, and CLEARFIELD canola.

Two years after the application, following crops can be grown in all soil zones: spring wheat, durum wheat, barley, sunflower, peas, canola, flax, oats, canary grass. Conduct a field bioassay before planting lentils and sugar beets.

Environmental Hazards

Avoid application of Assert FL within 15 meters of water bodies (lake, pond, slough, streams, rivers).

Toxicity

Low acute mammalian toxicity. Acute oral LD_{50} (rats) = 3,078 mg/kg. Non-toxic to fish, birds, and bees.

Frontline A: has extremely low acute toxicity. Acute LD_{50} = >6,000 mg/kg. Frontline B: has moderate acute toxicity.

Acute LD_{50} of technical = 700 - 800 mg/kg.

Storage

Store between 0° - 35° C. Do not freeze. Shake well before using.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.

Assure II/Yuma

Manufacturer: E.I. duPont Canada Co./Gowan Company

Group 1

Formulations

Product	Company	Active ingredient	Formulation	Container size
Assure II (PCP# 25462)	E.I. duPont Canada Co.	Quizalofop-p-ethyl: 96 g/L	EC	1 x 8 L
Sure-Mix (PCP# 25467)		Surfactant blend (30%) + Petroleum Oil (60%)		1 x 8 L
Yuma (PCP# 29134)*	Gowan Company	Quizalofop-p-Ethyl: 96 g/L	EC	
XA Oil Concentrate (PCP# 11769)	UAP	Surfactant blend (17%) + mineral oil (83%)		

* Herbicide package does not include surfactant but surfactant is required. XA Oil concentrate is recommended at 5 – 10 L/1000L of spray solution but other surfactants can be used.

Crops and Staging: No stage restrictions.

Canola	Flax or Solin (low linolenic varieties)	Peas (field and processing)	Snap beans
Common dry beans	Lentils	Seed alfalfa	Soybeans
Creeping red fescue (seed production)	Oriental mustard (condiment type)	Seedling legumes (seed production)	Sugar-beet

*Seedling legumes includes bird's-foot trefoil, alsike, red, white and sweet clover, and sainfoin.

Weeds, Staging and Rates

Weeds controlled	Weed leaf stage	Rate
Green foxtail	2 leaf to early tillering	Assure: 0.15 L/acre + Sure-Mix@ 0.5 – 1% v/v
Volunteer barley	2 leaf to early tillering	
Volunteer corn	2 – 6 leaf	
Volunteer oats*	2 leaf to early tillering	
Volunteer wheat	2 leaf to early tillering	
Wild oats*	1 – 5 leaf without tillers	
Barnyard grass	2 leaf to early tillering	Assure: 0.20 L/acre + Sure-Mix@ 0.5 – 1% v/v
Wild oats	1 – 5 leaf to early tillering (up to two tillers)	
Fall panicum	2 leaf to early tillering	
Old witchgrass	2 leaf to early tillering	
Proso millet	2 leaf to early tillering	
Yellow foxtail	2 leaf to early tillering	
Quackgrass (suppression)	2 – 6 leaf	Assure: 0.20 L/acre + Sure-Mix@ 0.5 – 1% v/v
Quackgrass (season-long control)	2 – 6 leaf	Assure: 0.30 L/acre + Sure-Mix@ 0.5 – 1% v/v

* Best results on volunteer/wild oats if application is made before tillering begins.

Tank Mixtures

In canola:

Assure (0.15 – 0.20 L/acre) + Muster (8 – 12 g/L) + Sure Mix or Merge (0.5% v/v)

In Creeping Red Fescue:

Assure (0.20 – 0.30 L/acre) + Ally Toss-N-Go (3 g/L) + Sure Mix or Merge (0.5% v/v)

In Pinto, Pink, Great Northern and Small Red Beans:

Assure II (0.20 – 0.30 L/acre) + Basagran (0.70 – 0.91 L/acre) + Sure Mix or Merge (0.5% v/v)

Safety information, see page 25

Application Information

Water Volume: Ground: Minimum of 40 L/acre. Up to 162 L/acre of water may be used under heavy populations to improve coverage. **Air:** 10-20 L/acre.

Nozzles: Only 80° and 110° flat fan recommended. **Pressure:** 210 - 275 kPa.

Application Tips

How it Works: Assure II is a systemic herbicide that is rapidly absorbed and readily translocated from the treated foliage to the root systems and growing points of treated plants.

Expected Results

Grassy weeds show a reduction in growth and a loss of competitiveness. An early yellowing or browning of the younger plant tissues is followed by a progressive collapse of the remaining foliage. These results will generally be observed in 1 - 3 weeks, depending on the grass species treated and the environmental conditions. Poor results may be expected if there is improper mixing, timing or coverage, or when weeds are under stress.

Effects of Rainfall: Rainfall within 1 hour of application may reduce control.

Restrictions

Re-cropping: No restrictions the year after application.

Grazing restrictions: Do not graze treated fields or harvest for forage or hay.

Pre-harvest Intervals: Do not apply to canola within 64 days of harvest. Do not apply to chickpeas within 85 days of harvest. Do not apply to flax within 82 days of harvest. Do not apply to lentils or peas (field and processing) within 65 days of harvest. Do not apply to beans within 30 days of harvest if used alone, 65 days if used in a tank mix with Basagran.

Environmental Hazards

Assure II is toxic to fish. Overspray or drift to fish-bearing water must be avoided. Overspray or drift to important wildlife habitats such as shelterbelts, wetlands, sloughs or dry slough borders and woodlots should be avoided. Leave a 15-metre buffer zone between the last spray swath and the edge of any of these habitats.

Toxicity

Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) >5,000 mg/kg. May irritate eyes, nose, throat and skin.

Storage

Store in a cool, dry place not below 5°C.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.



Caution Irritant

Atrazine

Group 5

Manufacturer: Syngenta Crop Protection Canada Inc./United Agri Products Canada Inc.

Formulations

Product	Company	Active ingredient	Formulation	Container size
Aatrex Liquid 480 (PCP# 18450)	Syngenta	Atrazine 480 g/L	Liquid suspension	1 x 14 L, bulk
Atrazine 480 (PCP# 20997)	United Agri Products	Atrazine 480 g/L		2 x 10 L pack

Crops and Staging

Timing	Rate	Crop		
Pre-plant incorporated	Light and sand: 0.85 - 1.25 L/acre	Silage corn (9.0)	Field corn	Sweet corn (8.6)
Pre-emergence*	Loam and clay: 1.25 L/acre			
Post-emergence (1 - 6 leaf stage)	0.85 - 1.25 L/acre plus 6.88 L/acre corn oil or 1.11 - 2.23 XA Oil concentrate			

*Rainfall is required within 10 days or a shallow cultivation will be necessary.

Safety information, see page 25

Atrazine (cont'd)

Note: For pre-plant incorporated and pre-emergence application, nitrogen solutions or complete liquid fertilizers may replace the water as a carrier. Do not apply after the corn has emerged, as there is danger of liquid fertilizer causing crop injury.

Weeds controlled

Annual smartweed
Common purslane
Lady's-thumb

Lamb's-quarters
Ragweed
Redroot pigweed

Volunteer clover
Wild oats
Wild buckwheat

Wormseed mustard
Wild mustard

Tank Mixtures

Fertilizers: For pre-plant incorporated and pre-emergence application, nitrogen solutions or complete liquid fertilizers may replace the water as a carrier. Do not apply after the corn has emerged as there is danger of liquid fertilizer causing crop injury.

Many dry bulk granular fertilizers may be impregnated with Aatrex or Aatrex Dual II Magnum or Eradicane 8E as a preplant incorporated application.

Oil-water emulsions (post-emergent treatment): Atrazine 480

Preplant-incorporated: Aatrex Liquid 480 (0.85 – 1.25 L/acre + DUAL II Magnum (0.5 – 0.7 L/acre).

Application Tips

Continuous gentle agitation is needed. Avoid excessive agitation, especially with oil mixtures, as a grease-like mass may form. Use oil mixes at once and clean tank and system with a strong detergent solution. Use 50 mesh or larger strainers and use only metal filters. Bypass line should discharge to bottom of tank. Band treatments are desirable when cultivation is to alleviate hard soil conditions or to control annual weeds.

How it Works

A systemic herbicide absorbed through both roots and foliage and it is translocated to the leaves where it inhibits photosynthesis.

Expected Results

Affected plants are slow to emerge and are wilted, yellowish and eventually turn brown and die. Poor weed control may be expected if improper incorporation is done, or when post-emergent application is made with oil concentrate or sprayed too late. Heavy rainfall on sandy soils may cause leaching and a decrease in weed control and/or crop injury.

Effects of Rainfall: Rainfall will activate the chemical, carrying it into the root zone where kill will begin.

Grazing: Do not graze treated immature crops or cut for fodder.

Restrictions

Recropping: Plant only to corn in year of treatment. The use of atrazine on the prairies is not recommended when corn is grown in rotation with other crops except triazine-tolerant canola. Breakdown of atrazine in the soil is slow and may cause injury to sensitive crops (e.g. cereals, canola, sugar beets) one or more years after application. Crops most tolerant after corn and triazine tolerant canola are sorghum, then flax, faba beans and peas. The risk of damage to succeeding crops from atrazine residues may be reduced by ploughing or deep tilling treated fields in the fall prior to seeding the next crop in the rotation. Spreading and incorporating manure may also help to reduce the atrazine levels. Uneven application, excessive sprayer overlap or applications in excess of recommended rates will not injure corn but may result in a longer carryover of atrazine residues. A prolonged period of dry weather will also lengthen the time that atrazine residues remain in the soil.

Environmental Hazards

Toxic to non-target terrestrial plants and aquatic organisms. Do not over-spray or drift to non-target aquatic habitats. Leave at least 10 m from the downwind edge of the spray swath to the sensitive terrestrial and aquatic habitats. Do not mix or load within 30 m of any wells, lake, streams, ponds, dugouts or sinkholes. Heavy rainfall on sandy soils may cause runoff and leaching. To reduce runoff from treated areas into aquatic habitats, consider the characteristics and conditions of the site before treatment. Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip (buffer zone) between the treated area and the edge of the water body. The use of Atrazine may result in contamination of groundwater, particularly on areas where soils are permeable (e.g., sand, loamy sand and sandy loam soils) and/or the depth to the water table is shallow.

Toxicity

Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) Aatrex = 1,075 mg/kg. May cause eye irritation. Very low toxicity to fish and birds.

Safety information, see page 25

Storage

The flowable formulations should be kept from freezing. If stored in unheated areas, the product should be warmed and agitated thoroughly prior to using.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.



Caution Irritant



Caution Poison

Attain/Attain XC

Manufacturer: Dow AgroSciences Canada Inc.

Group 4

Formulations

Product	Company	Active Ingredient	Formulation	Container size	Acres to treat per package
Attain A (PCP# 24834)	Dow AgroScience Canada Inc	Fluroxypyr: 180 g/L	EC	9.6 L	40 – 50 acres
Attain B (PCP# 24833)		2,4-D LV ester: 564 g/L	EC	2 X 8 L	
Attain XC A (PCP# 29643)	Dow AgroScience Canada Inc	Fluroxypyr: 333 g/L	EC	5 L, 8 x 15 L	40 or 53 acres (case), 960 or 1280 acres (pallet)
Attain XC B (PCP# 29264)	Dow AgroScience Canada Inc	2,4-D LV ester: 660 g/L	EC	2 x 6.8 L, 4 x 81.6 L	

Crops and Staging

Cereals: 4 – flag leaf stage

Seedling and established grasses (seed production only): 2 – 4 leaf stage

Barley	Crested Wheatgrass*	Intermediate wheatgrass*	Smooth bromeegrass*	Tall fescue*
Creeping red fescue*	Durum wheat	Meadow bromeegrass*	Spring wheat	Timothy*

* Registered under the User Requested Minor Use Registration. Dow Agro Science assumes no responsibility with respect to performance and/or crop tolerance.

Weeds controlled

Weed stage: 2 – 4 leaf stage, unless otherwise noted

Low rate: Attain A: 0.18 L/acre. Attain B: 0.3 L/acre or Attain XC A: 0.095 L/acre, Attain XC B: 0.26 L/acre (at low rate, one case will treat 53 acres)

Annual sunflower	Field horsetail (top growth)	Mustards (except green, dog & tansy)	Shepherd's-purse (9.0)
Bluebur	Flixweed (9.0)	Plantain	Vetch
Burdock	Goat's-beard	Prickly lettuce	Volunteer canola
Cleavers (1-4 whorls) (8.8)	Hoary cress (top growth)	Ragweed	Wild mustard
Clovers (sweet)	Kochia (8.0)*		Wild radish

High rate: Attain A: 0.24 L/acre. Attain B: 0.4 L/acre or Attain XC A: 0.13 L/acre, Attain XC B: 0.34 L/acre, above weeds plus following (at low rate, one case will treat 40 acres)

Annual sow-thistle (suppression)	Dog mustard	Leafy spurge (top growth)	Smartweed (8.3)
Blue lettuce (top growth)	Field bindweed (top growth)	Oak-leaved goosefoot	Stork's-bill (1-8 leaf)
Canada thistle (top growth)	Field peppergrass	Perennial sow-thistle (top growth) (suppression)	Tansy
Common chickweed* (up to 8 cm)	Gumweed	Redroot pigweed (8.8)	Tartary buckwheat
Dandelion (spring rosettes)	Hairy galinsoga	Round-leaved mallow (1-6 leaf)	Volunteer flax (1-12 cm)
Docks	Hedge bindweed	Russian thistle (7.6)	
	Hemp-nettle (2-6 leaf stage)		
	Lady's-thumb		

* Including biotypes resistant to Group 2 herbicides that inhibit ALS/AHAS enzymes

Tank Mixes

Herbicide tank mix partner	Crops registered	Rate of herbicide tank mix partner	Adjuvant rate
Achieve Liquid*	Barley, spring wheat, durum wheat	0.2 L/acre	Turbocharge @ 0.5% v/v

Attain/Attain XC (cont'd)

Herbicide tank mix partner	Crops registered	Rate of herbicide tank mix partner	Adjuvant rate
Everest	Spring wheat, durum wheat	17.4 g/acre	Agral 90 or Ag Surf @ 0.25% v/v
Horizon**	Spring wheat, durum wheat	93 ml/acre	Score @ 0.8% v/v
Assert SC	Barley, spring wheat, durum wheat	0.53 – 0.65 L/acre	Acidulate
Puma 120 Super	Spring and durum wheat	0.16 – 0.31 L/acre	None required
Simplicity***	Spring and durum wheat	0.2 L/acre	

* Do not apply this tank-mix prior to the 4-leaf stage of the cereal crop as temporary crop injury could occur, particularly in spray overlaps.

** Wild oat control may be reduced when tank mixed with Attain.

*** The low rate of Attain is registered for use as a tank mix with Simplicity.

Application Information

How to Apply: Ground applications. **Do not apply by air.**

Water Volume: 45 L/acre. **Nozzles:** Flat fan is recommended. Use 50 mesh or larger screen. **Pressure:** 135 - 270 kPa.

Application Tips

Attain/Attain XC activity is influenced by weather conditions. Optimum activity requires active crop and weed growth. The temperature range for optimum activity is 8°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost before application (3 days) or shortly after (3 days) may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions, e.g. drought, heat or cold stress, or if weeds have initiated flowering, or if heavy infestations exist. Application before the 4-leaf stage of wheat and barley may cause severe twisting of leaves and leaf, stem and head deformities, which may reduce yield up to 10%. Do not apply later than the flag-leaf stage. Some twisting may be evident on barley. This twisting is transitory and may disappear within 3 weeks.

How it Works

Attain herbicide tank mix is non residual. The components of Attain tank mix move within the plant to control exposed and underground plant tissue. It mimics naturally occurring plant hormones and controls weeds by disrupting normal plant growth patterns. Symptoms include twisting of stems and swollen nodes.

Expected Results

Broadleaf weeds: Weeds start to twist shortly after spraying. After twisting and bending, plants stop growing, turn brown and die.

Restrictions

Effects of Rainfall: Do not apply if rain is expected in 1 hour.

Grazing: Do not permit lactating dairy animals to graze fields within 7 days after application. Do not harvest forage or cut for hay within 30 days after application. Withdraw meat animals from treated fields at least 3 days prior to slaughter.

Pre-harvest Intervals: Do not harvest the treated mature crop within 60 days after application.

Recropping: Fields treated with Attain/Attain XC herbicides tank mix can be seeded the following year to barley, canola, flax, forage grasses, lentils, mustard, oats, peas, rye, wheat or summerfallowed. Do not seed crops other than those listed above for at least one year following treatment.

Environmental Hazards

Overspray or drift to important wildlife habitats, such as ponds, wetlands, streams, woodlots and shelterbelts, should be avoided. A 15-metre buffer zone should be established between areas to be sprayed and aquatic environments or terrestrial habitats listed above.

Run-off: Under certain conditions, Attain/Attain XC have the potential to run-off from treated areas. To reduce runoff from treated areas into aquatic habitats, consider the characteristics and conditions of the site before treatment. Site characteristics and conditions that may lead to runoff include, but are not limited to heavy rainfall, moderate to steep slope, bare soil, poorly draining soil (e.g. soils that are compacted, fine textured, or low in organic matter such as clay). Avoid application of this product when heavy rain is forecast. Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip (buffer zone) between the treated area and the edge of the water body.

Toxicity

2,4-D has moderate acute mammalian toxicity. Acute oral LD₅₀ = technical 639 - 764 mg/kg. Fluroxypyr has very low mammalian toxicology. Acute oral LD₅₀ >2,000 mg/kg.

Storage

Store in a dry heated area. If product is frozen, bring to room temperature and agitate before use.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.

Avadex MicroActive/ Extra Strength Avadex BW



Warning Poison

Manufacturer: Gowan Company

Group 8

Formulations

Product	Company	Active Ingredient	Formulation	Container size
Avadex MicroActive (PCP# 16759)	Gowan Canada	Triallate: 10%	Granular	22.7 kg, 451.3 kg
Extra Strength Avadex BW (PCP# 25112)	Gowan Canada	Triallate: 480 g/L	EC	2 x 10 L, 100 L drum

Crops and Staging

Wheat (including durum) and barley: 2 – leaf to early flag leaf; winter wheat, fall rye: from the time growth commences to early flag leaf

Barley (8.9)

Field peas (9.0)

Mustard (9.0)

Spring wheat (8.9)

Canarygrass

Flax (8.9)

Rapeseed (8.2)

Sugar-beet (8.0)

Durum wheat (8.3)

Note: Alfalfa, bird's-foot trefoil and clover may be underseeded (provided they are not harvested for green feed, hay or silage in the year of treatment). Do not underseed with grasses or legume grass mixture.

Weeds controlled and staging

Wild oats (7.6)

Extra Strength Avadex Liquid Rates:

Fall treatment – after October 1 and until soil freeze-up.

Crop	Rate (L/acre)			Acres treated per 100 L drum		
	Organic matter			Organic matter		
	< 2%	2 – 4%	> 4%	< 2%	2 – 4%	> 4%
Spring and durum wheat	1.01	1.17	1.41	99	85.4	70.9
Barley	1.01	1.17	1.41	99	85.4	70.9
Canola, flax*, mustard, sugar-beets	1.41	1.41	1.86	70.9	70.9	53.8

Spring treatment – before or after seeding

Crop		Rate (L/acre)		Acres treated per 100 L drum	
		Organic matter		Organic matter	
		4% or less	Greater than 4%	4% or less	Greater than 4%
Spring and durum wheat	Before seeding	1.01	1.17	99	85.4
	After seeding	1.17	1.41	85.4	70.9
Barley	Before seeding	1.01	1.17	99	85.4
	After seeding	1.17	1.41	85.4	70.9

Avadex MicroActive/Extra Strength Avadex BW (cont'd)

Crop		Rate (L/acre)		Acres treated per 100 L drum	
		Organic matter		Organic matter	
		4% or less	Greater than 4%	4% or less	Greater than 4%
Canola, flax*, mustard, sugar-beets	Before seeding	1.41	1.86	70.9	53.7
Peas	Before seeding	1.41	1.41	70.9	70.9

* Do not use on low linolenic acid varieties of flax.

Avadex Microactiv Granular Rates (kg/acre) – Minimum Tillage/Direct Seed Systems

Crop		Rate (kg/acre)		Acres treated per 22.7 kg bag	
		Organic matter		Organic matter	
		2–4%	Greater than 4%	2–4%	Greater than 4%
Fall application					
Spring and durum wheat		5.6	6.9	4.0	3.3
Barley and canarygrass		5.6	6.9	4.0	3.3
Canola, flax*, mustard, sugar-beets		6.9	8.9	3.3	2.6
Spring application					
Spring and durum wheat		5.6	6.9	4.0	3.3
Barley and canarygrass		5.6	6.9	4.0	3.3
Canola, flax*, mustard, sugar-beets		6.9	8.9	3.3	2.6

* Do not use on low linolenic acid varieties of flax.

Avadex MicroActiv Rates – Conventional Tillage Systems

Crop		Rate (kg/acre)			Acres treated per 22.7 kg bag		
		Organic matter			Organic matter		
		Less than 2%	2–4%	Greater than 4%	Less than 2%	2–4%	Greater than 4%
Fall Applications (incorporated)							
Spring and durum wheat		4.45	5.67	6.9	5.1	4.0	3.3
Barley and canarygrass		4.45		6.9	5.1	4.0	3.3
Canola, flax*, mustard, sugar-beets		5.67	6.9	8.9	4.0	3.3	2.6

* Do not use on low linolenic acid varieties of flax.

Tank Mixes

Fertilizers: Extra Strength Avadex BW alone or tank-mixed with liquid formulations of Treflan or Rival may be tank-mixed in a minimum of 36 litres of sprayable fluid fertilizer carrier (such as 28-0-0) per acre as a broadcast treatment.

Herbicides: Extra Strength Avadex BW can be tank mixed with Treflan or Rival herbicide for the control of both wild oats and wild millet (green and yellow foxtail). This tank mixture can be applied after seeding wheat and barley only.

How to Apply

Extra Strength Avadex BW can only be applied by ground application. Granular formulations may be applied by air with attachments designed for applying low volumes of granules (Avadex MicroActiv).

Application Information

Liquid formulations:

Water volume: Minimum of 36 L/ac. Pressure: 200 kPa. Nozzles: Flat fan recommended.

Incorporation:

Extra Strength Avadex BW/MicroActiv in conventional tillage systems: Two incorporation operations are necessary for thorough mixing. For application made prior to seeding, incorporation with disc plus harrows or field cultivator plus harrows is recommended. The second incorporation should be at a right angle to first, with suitable disc or cultivator type implement. For application made after seeding, shallowly incorporate to a depth of 4 - 5 cm using suitable equipment such as harrow. The second incorporation can be conducted any time prior to crop emergence. Adjust incorporation equipment to a depth that will not disturb the seed. Do not incorporate more than 5 cm. This can be accomplished by setting the tillage equipment to work the soil no deeper than 7.5 cm - 10 cm. Shallow incorporation is necessary to prevent dilution of the product, thus decreasing wild oat control and increasing the risk of crop injury.

Liquid: The first incorporation should be completed as soon as possible on the day of spraying.

Granules: The first incorporation should be completed within 48 hours of application. The second incorporation for both liquid and granules may or may not be done immediately after the first. For maximum results from spring application of granules, delay second incorporation for at least 3 - 5 days.

Extra Strength Avadex BW/MicroActiv + fertilizer banding: Avadex BW/MicroActiv may be broadcast prior to or in conjunction with fall fertilizer banding. Banding unit should be operated at no less than 8 km/h to provide adequate soil mixing. Depth of operation of banding unit should be as recommended for proper fertilizer placement. Effective shank spacing of 30 cm or less will provide optimum results.

Spring application: If Extra Strength Avadex BW/MicroActiv is applied in the spring prior to banding unit operated using knife-type openers, two additional incorporations are required at right angles.

Fall application: The use of tine harrow on banding unit is not required but may provide superior incorporation where excessive trash is not a factor. The second incorporation should be at a right angle to the banding operation with suitable disc or cultivator type implement.

Extra Strength Avadex BW/MicroActiv in high disturbance systems (minimum tillage): A high disturbance incorporation can be conducted prior to seeding or as part of the seeding operation. A high disturbance system is one that disturbs the soil enough so that emerged weeds are controlled by the tillage. (High disturbance may be caused by the seed drill - cultivator or disc type, or with harrows following the seed drill or both.) Levelling the soil at or after seeding with harrows will ensure uniform product coverage and best performance. Application of granules 10 - 14 days prior to incorporation is required for best results.

Application Tips

Choice of formulation: Use liquid formulation on soil free of trash. Use granules on all soils including those with heavy trash cover. Granules may be applied in the fall prior to or in conjunction with fertilizer banding.

Fall minimum tillage application: Fall minimum tillage applications should be made when the average soil temperature at the 5 cm depth is 4°C or less and within 3 weeks of soil freeze-up. This situation generally occurs by October 1. No fall incorporation is required. Incorporation may be conducted in the spring prior to seeding or at seeding. Do not use this treatment on soil with less than 2% organic matter. Under excessively warm or wet conditions between application and crop emergence, control may be reduced. For best results on heavy wild oat infestations, use the incorporated treatments only.

Spring minimum tillage application: Apply Extra Strength Avadex BW/MicroActiv granules in the spring when average soil temperature at the 5 cm depth is 4°C or less. Applications should be made to soil which has adequate trash cover to prevent soil erosion between application and seeding. Ensure that the time between application and incorporation is a minimum of 10 - 14 days. Do not apply more than 4 weeks before intended seeding.

For optimum results with Extra Strength Avadex BW minimum tillage treatments, seed when wild oat growth is noticeable in the field. This will ensure that the soil is warm enough for activation of Avadex BW. Minimum tillage applications should not be made to fields covered with snow or excessive crop residue that will not allow granule contact with soil. If excessive crop residue exists at the time of application, a vigorous harrowing can be used to ensure that the herbicide granules make adequate contact with the soil. Under excessively warm or wet conditions between application and crop emergence, control may be reduced. For best results on heavy wild oat infestations, use the incorporated treatment only. Soil colour may not be a precise indicator of organic matter content. Ensure that the application rate chosen from the table is appropriate for your soil type.

Field preparation: Make sure the soil is in good working condition. Reduce trash to an acceptable level before application. If soil is excessively wet or lumpy, cultivate with suitable equipment to improve soil condition.

Avadex MicroActive/Extra Strength Avadex BW (cont'd)

Seeding: Flax, mustard and rapeseed can be seeded in treated layers. Barley and wheat are more sensitive and should be planted 6.0 - 7.5 cm. Wheat must be seeded below the treated layer. After seeding, any deep ridges left by drills must be levelled by harrowing. Treflan/Rival Mixes: Drought conditions in the year of treatment may result in higher levels of Treflan/Rival carryover. To avoid wheat injury, seed 6.0 - 7.5 cm into warm, moist seedbed.

How it Works

Absorbed by germinating wild oat shoots, usually resulting in death before emergence. Under dry conditions, wild oats may emerge before being killed.

Expected Results

Wild oats: Usually kills wild oats before they emerge. Scraping away the soil 1 - 2 weeks following treatment will expose white to yellow wild oat shoots 2.0 - 2.5 cm in length with pinched tips. Plants, which have emerged and absorbed a lethal dose will cease growth, leaves become brittle and bluish-green in colour. Under dry conditions, a rainfall of 1.5 cm or more when wild oats are emerging can cause post-emergent die-back of a high percentage of wild oat plants.

Crop: Wheat seeded into the treatment zone under very dry soil conditions may be thinned and delayed when germinating and emerging just prior to a heavy rainfall. Wheat must be seeded at least 1.5 cm below the treated layer of soil (e.g. 5 - 7.5 cm). Some wheat thinning may be noted on eroded knolls. Poor results may be expected if incomplete incorporation due to wet, cloddy soil or heavy trash, incorporation delayed, very dry soil conditions in spring or prolonged cool soil temperatures at time of germination. Ridges left by seeding may disrupt the treated layer and allow escapes.

Restrictions

Effects of Rainfall: Moisture is required for activation. Rainfall of at least 1.5 cm within 2 weeks of application in the spring is required to ensure maximum performance.

Grazing restrictions: Treated underseeded legumes cannot be harvested for green feed, silage or hay in year of seeding. Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.

Re-cropping: Oats should not be seeded into soil treated with Extra Strength Avadex BW/MicroActiv in the previous year.

Environmental Hazards

Do not apply directly to water, to areas where surface water is present. **Runoff** – to reduce runoff from treated areas into aquatic habitats, consider the characteristics and conditions of the site before treatment. Site characteristics and conditions that may lead to runoff include, but are not limited to, heavy rainfall, moderate to steep slope, bare soil, poorly draining soil (e.g. soils that are compacted or fine textured such as clay). Avoid application when heavy rain is forecast. Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip between the treated area and the edge of the water body. **Leaching** – the use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable (e.g. sandy soil) and/or the depth to the water table is shallow. **Volatilization** – the active ingredient contained in this product is known to volatilize. Effort should be made to reduce the volatilization such as the following: (1) incorporation into the soil concurrently with application, (2) application should occur when soil temperatures are less than 4°C or less.

Toxicity

Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = 1,675 - 2,165 mg/kg. May cause slight eye irritation. Slightly toxic to fish. Non-toxic to birds.

Storage

Store above 0°C. If frozen, warm to 22°C and agitate to redissolve crystals.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.

Avenge 200-C



Warning Poison

Manufacturer: Syngenta Crop Protection

Group 8

Formulations

Product	Company	Active ingredient	Formulation	Container size	Acres to treat per 20 L pail
Avenge 200-C	Syngenta Crop Protection	Difenzoquat: 200g/L	Liquid	2 x 10L jugs	11.6 – 14.0 acres

Crops and Staging

Apply up to 6-leaf stage of cereals and grasses

Cereals

Barley (all varieties) (8.7)
Canaryseed (8.40)
Fall rye (Cougar, Frontier,
Kodiak, Puma, Rymin (8.6)

Spring wheat: AC Barrie, Bigger, Bluesky, CDC
Makwa, CDC Teal, Columbus, Conway, Cutler,
Fielder, Genesis, Glenlea, Katepwa, Lancer, Leader,
Neepawa, Oslo, Pasque, Selkirk, Wildcat

Triticale (carmen, welsh)
Winter wheat (Norstar only)

Seeding grasses for forages:

Meadow brome grass
Meadow foxtail

Pubescent wheatgrass
Streambank wheatgrass

Tall fescue
Tall wheatgrass

Forages underseeded to wheat or barley

Alfalfa (7.9)
Bird's-foot trefoil,
Brome grass (7.9)
Creeping Red fescue (7.8)

Crested wheatgrass
Kentucky bluegrass
Meadow fescue (7.4)
Orchard grass (7.8)

Red clover (7.20)
Red Fescue
Reed canary grass (7.0)
Russian wild rye (6.5)

Sweet clover (7.5)
Timothy (5.1)

Weeds, Staging and Rates

Weeds Controlled	Rates	Staging
Wild oats (1 – 200 plants/m ²)	1.42 L/acre	3 – 5 leaf (optimum: 3 – 4 leaf)
Wild oats (over 200 plants/m ²)	1.72 L/acre	3 – 5 leaf (optimum: 3 – 4 leaf)

Tank Mixes

Herbicide tank mix partner	Crops registered	Rate of herbicide tank mix partner	Remarks
2,4-D ester 500	Wheat and barley	Up to 0.45 L/acre	Do not apply by air
2,4-DB: Cobutox [®] 625, Embutox 625, Caliber 625	Wheat, barley underseeded to forage grasses	0.71 – 0.91 L/acre	Do not apply to canarygrass
2,4-D Ester plus Dichlorprop: Estoprop Plus, Turboprop 600, Dichlorprop-D	Wheat and barley only	0.71 L/acre	Do not apply when underseeded to legumes
Ally Toss-N-Go	Wheat and barley	2 – 3 grams /acre	Do not add surfactant
Buctril M	Wheat and barley	0.4 L/acre	Use only on spring wheat varieties listed on the label
Curtail M	Wheat and barley	0.8 L/acre	Do not apply when underseeded to forages
MCPA ester 600 formulation	Wheat and barley	0.36 L/acre	
Pardner	Wheat and barley	0.4 – 0.48 L/acre	Do not apply by air
Refine Extra	Wheat and barley	8 grams/acre	Do not add surfactant

* Note: Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions

Safety information, see page 25

Avenge 200-C (cont'd)**Application information**

How to Apply: Ground and by air.

Water volume: **Ground Applications:** 40 L/acre. **Air:** 8 - 20 L/acre.

Nozzles: Flat fan recommended; tilted 45° forward for better spray penetration. 50 mesh metal screens and filters.

Pressure: 275 kPa. Lower pressures may result in poor control.

Application Tips

Do not apply if the crop is stressed from extreme drought or excessive moisture. Do not spray if freezing temperatures are forecast. Avenge can be sprayed if leaf surface is wet, as long as the spray solution will not drip off the leaf surface after application. Apply a minimum of 30 days after seeding for best results.

How it Works

Acts on the growing point located at or just above the soil surface; placing herbicide at or below this point is most efficient. Disrupts cell division and elongation causing growth to stop. Best at high temperature and humidity.

Expected Results

Wild oats: Start to yellow within 3 - 5 days. Effect is faster when temperature and humidity are high. Affected plants will turn brown or remain stunted and partially green throughout the season but competitive effect will be removed. Wild oats in the 1 - 2 leaf stage at spraying or those that emerge after spraying will be unaffected.

Crop: Slight yellowing may be visible 5 - 7 days after application and will remain visible for 2 weeks. Poor results may be expected if spraying before 3 leaf stage; too low a rate for wild oat population; inadequate coverage due to dense broadleaf weeds; drought or temperature stress.

Restrictions

Effects of Rainfall: Do not spray if rainfall is forecast within 6 hours of application.

Grazing: Do not graze or feed crop for 8 weeks after treatment. Treated underseeded forages or seedling grasses for forage should not be grazed or harvested for feed during the year of treatment. **Crop use after hail:** Do not process for 8 weeks after treatment.

Re-cropping: No restrictions the year after treatment.

Environmental Hazards

Do not apply to any body of water. Avoid drifting of spray onto any body of water or other non-target areas.

Toxicity

Moderate acute mammalian toxicity. Acute oral LD₅₀ (rats) = 863 - 912 mg/kg. Non-toxic to fish, birds or bees.

Storage

Will withstand freezing temperatures, returning to full solution as temperature increases.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.

Axial 100 EC



Caution Poison Caution Irritant

Manufacturer: Syngenta Crop Protection Canada

Group 1

Formulations

Product	Company	Active Ingredient	Formulation	Container size
Axial (PCP# 28642)	Syngenta Crop Protection Canada	Pinoxaden: 100 g/L	Emulsifiable concentrate	1 X 9.7 L, 76.8L
Adigor (adjuvant) (PCP# 28151)	Syngenta Crop Protection Canada	48.8% Rapeseed oil + 28.2% alcohol	Liquid	1 X 11.3 L

Acres to treat per package: One 9.7 L container will treat 40 acres.

Crops and Staging

Crop	Staging (Zadoks Growth Stage)
Spring wheat (excluding durum) and barley	1 - leaf to flag leaf stage (11, 20 to 37) Caution: Do not apply past flag leaf stage

Weeds, Rate and Staging

Weeds	Rate	Staging
Green foxtail, barnyard grass, yellow foxtail (wild millet), Proso millet, volunteer oats, volunteer canaryseed, wild oats	Axial 100 EC @ 0.24L/acre plus Adigor: @ 0.283 L/acre	1 - 6 leaf, prior to 4th tiller Zadoks Growth Stage: (11, 20 to 16 and 23)

Tank Mixes

Tank Mix Partner ¹	Product Rate	Remarks
Buctril M ⁴	0.4 L/acre	Temporary crop injury may occur with tank-mixes under extreme weather conditions or when the crop is suffering from stress due to inadequate or abnormally high moisture levels or extreme temperatures
Curtail M ⁴	0.6 - 0.81 L/acre	
MCPA ester 500 ⁴	0.34 - 0.44 L/acre	
Mextrol 450 M ⁴	0.50 L/acre	
Prestige ⁴	Prestige A: 0.24 - 0.33 L/acre	
Trophy ⁴	Trophy A: 0.24 L/acre + Trophy B: 0.45 L/acre	
Frontline/Frontline XL ^{3,4}	Frontline A: 40 mL/acre + Frontline B: 0.34 L/acre, XL 0.51 L/acre	
Spectrum ^{3,4}	Spectrum A: 40 mL/acre + Spectrum B: 0.60 L/acre	
Infinity	0.335 L/ac	
Refine SG ²	12 gram/acre	
Refine SG + MCPA ester 500 ^{3,4}	Refine SG: 12 grams/acre + MCPA ester 500: 0.23 - 0.285 L/acre	
Refine SG Toss-N-Go ²	12 gram/acre	
Refine SG Toss-N-Go + MCPA ester 500 ^{3,4}	Refine SG: 12 grams/acre + MCPA ester 500: 0.23 - 0.285 L/acre	
Tilt 250 E (fungicide)	101 - 202 mL/acre	

¹ Always consult the label of the broadleaf herbicide prior to use.

² Addition of surfactants other than Adigor adjuvant are not required.

³ Suppression only on green foxtail.

⁴ A reduction in barnyard grass control may be observed when Axial is tank mixed with these broadleaf herbicides.

Axial 100 EC (cont'd)**Application Information**

How to Apply: With ground equipment only. **Do not apply by aircraft.**

Nozzles: Flat fan. **Pressure:** 275 - 310 kPa.

Application Tips

For optimum control, apply Axial 100EC herbicide to actively growing weeds, ideally at the 2 - 3 leaf stage. An early application will maximize crop yields by reducing weed competition. Weeds emerging after application of Axial 100EC herbicide will not be controlled. Weed control following application of Axial 100EC herbicide alone, or in combination with broadleaf weed herbicides, can be reduced or delayed under stress conditions such as drought, heat, insufficient fertility, flooding or prolonged cool temperatures. Grass escapes or re-tillering may occur if application is made during prolonged stress conditions. Optimum weed control will be obtained if application of Axial 100EC herbicide is delayed until the stress conditions have ended, and weeds are once again actively growing. Do not apply to crop that is stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result.

How it Works

Axial 100EC herbicide is absorbed by the leaves and is rapidly translocated to the growing points of leaves and stems. Thorough coverage of the plants is essential for consistent control.

Expected Results

Actively growing susceptible grasses stop growing within 48 hours of treatment. Depending on species, growing conditions and crop competition, leaves and growing points turn yellow within one to three weeks after application. Further colour changes and loss of vigour will be observed, followed by a browning and control three to five weeks after application.

Restrictions

Effects of Rainfall: Axial 100EC herbicide alone can be used one hour before rainfall.

Grazing: Observe a minimum of 7 days before grazing livestock on crops treated with Axial 100EC herbicide.

Pre-harvest interval: 60 days after treatment for grain and straw and 30 days after treatment for hay.

Re-cropping: For fields treated with Axial 100EC herbicide, no crop may be seeded until the following year. There are no crop rotation limitations the year following application of Axial 100EC herbicide.

Environmental Hazards

This product is toxic to aquatic organisms and non-target terrestrial plants. Leave 1 meter between the downward edge of the boom and sensitive terrestrial habitats of less than 1 meter depth. Axial 240 EC may otherwise be applied up to the edge of fresh water habitats 1 meter deep or greater.

Toxicity

Acute Oral LD₅₀ (rat) = >3,129 mg/kg; Acute Dermal LD₅₀ (rat) = >2,000 mg/kg.

Storage

Store the product in closed, original container in a well-ventilated room.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.

Banvel II/Oracle Dicamba



Warning Irritant



Caution Poison

Manufacturer: BASF Canada Inc, Gharda Chemical Ltd

Herbicide Group 4

Formulations

Product	Company	Active ingredient	Formulation	Container size
Banvel II (PCP# 23957)	BASF	Dicamba: 480 g/L	Solution	2 x 10 L jugs, 1000 L bulk
Oracle Dicamba (PCP# 26722)	Gharda Chemical Ltd	Dicamba: 480 g/L	Solution	2 x 10 L jug

Crops and Staging

Crop	Stage	Rate	Acres to treat per 10 L jug
Barley* (8.2)	2 – 5 leaf	93 – 117 mL/acre	107.5 – 85
Spring wheat, including durum* (8.2)	2 – 5 leaf	93 – 117 mL/acre	107.5 – 85
Winter wheat* (8.2)	2 – 5 leaf	93 – 117 mL/acre	107.5 – 85
Oats* (8.6)	2 – 5 leaf	93 – 117 mL/acre	107.5 – 85
Spring rye*	2 – 3 leaf	93 – 117 mL/acre	107.5 – 85
Field corn	Emergence to 5 leaf up to 20 cm. Use 20 – 50 cm use drop nozzles	242 mL/acre	41.0
Canaryseed*	3 – 5 leaf	117 mL/acre	85.0
Seedling grasses**	2 – 4 leaf	93 – 117 mL/acre	107.5 – 85
Red fescue	Seedlings: up to 5 cm. Established: up to flag leaf	243 mL/acre	41.0
Pasture	Established: actively growing	0.85 – 1.48 L/acre	11.7 – 6.8
Rangeland			
Pre-seed weed burndown (cereals) Banvel II + glyphosate (360 formulation)	Apply according to leaf stage	Banvel II: 127 mL/acre + glyphosate: 0.38 L/acre + surfactant	79
Chem-fallow (Banvel + glyphosate)	2 to 4-leaf stage of weeds	Banvel II: 117 – 243 mL/acre + glyphosate: 0.38 L/acre + surfactant (0.5% V/V)	41 – 85
Chem-fallow (Banvel II + 2,4-D)	Apply according to leaf stage	Banvel II: 93 – 127 mL/acre + 2,4-D amine 500: 0.45 L/acre	
Fall stubble	Apply according to leaf stage	1.0 L/acre	10
Fall stubble (Banvel II + glyphosate)	Apply according to leaf stage	Banvel II: 0.5 L/acre + glyphosate: 0.38 L/acre	20
Low bush blueberries	After 90% of the blueberries have dropped their leaves.	1.9 – 2.87 L/acre	
Brush control: alder, poplar, cherry, prickly rose, western snow berry, wolf willow, wild rose	Apply in spring or early summer, when brush species are under 2 meters tall.	0.84 – 1.47 L/acre	

* Should be tank mixed with 2,4-D or MCPA or any other registered tank mixed partner for broad-spectrum weed control.

** Seedling grasses includes creeping red fescue, crested wheatgrass, intermediate wheatgrass, meadow fescue, meadow foxtail, orchard grass, pubescent wheat grass, slender wheatgrass, smooth bromegrass, streambank wheatgrass, tall fescue, tall wheatgrass, timothy.

Banvel II/Oracle Dicamba (cont'd)**Weeds controlled****Banvel II/Oracle applied alone at 93 – 117 mL/acre**

Canada thistle (top growth only)	Cow cockle (6.9)	Perennial sow-thistle (top growth only)
Cleavers (high rate only)	Green smartweed (6.4)	Tartary buckwheat (6.7)
Corn spurry	Lady's thumb	Wild buckwheat (7.9)

Banvel II/Oracle applied with 2,4-D (amine or ester) or MCPA (amine or K-salt)

Burdock (young seedlings)	Flixweed	Redroot pigweed	Volunteer sunflower***
Canada thistle	Green smartweed	Russian pigweed	Wild buckwheat
Cleavers (high rate only)	Hemp-nettle**	Russian thistle	Wild radish
Cocklebur	Kochia	Shepherd's-purse	
Corn spurry	Lady's thumb	Tartary buckwheat	
Cow cockle (6.9)	Perennial sow-thistle	Volunteer canola *	

Prior to seeding (pre-seed weed burn-down) in cereals (wheat, barley, rye, oats, and field corn only)

Banvel II/Oracle applied at 127 mL/acre with glyphosate (378 mL/acre) plus non-ionic surfactant (0.5% v/v) will control the following weeds

Cleavers (1-4 whorls)	Green foxtail	Persian darnel	Volunteer cereals
Cow cockle	Green smartweed	Redroot pigweed	Wild buckwheat
Downy brome	Kochia	Russian thistle	Wild mustard
Flixweed**	Lady's-thumb	Stinkweed**	Wild oats
Foxtail barley	Lamb's-quarters	Volunteer canola***	

* Apply at the 1 to 4-leaf stage.

** For optimal control of winter annual broadleaf weeds such as flixweed and stinkweed, 2,4-D should be applied to emerged, actively growing weeds in the fall the year prior to Banvel II + glyphosate. Spring pre-seeding tank-mix. Refer to the 2,4-D product label for appropriate rates.

*** Not including glyphosate tolerant canola, i.e. Roundup Ready canola.

Canada thistle and Perennial Sow-thistle Control in Summerfallow and Stubble:

Apply before thistles reach early bud stage (15 - 25 cm tall). For the most effective control of Canada thistle, follow a long-term approach that includes in crop, post-harvest, and summerfallow treatments, in conjunction with tillage operations. If application is made after September 1, or if soil moisture levels are extremely low after application, crop injury may occur in the spring following application.

Perennial Rosette Control in Summerfallow: For Canada thistle and/or perennial sow thistle only, perform the final tillage operation the last week of July or first week of August. Allow thistles to regrow for a minimum of 4 weeks and apply when the majority of thistles have emerged. Apply before thistles reach early bud stage (15 - 25 cm tall) and at least 2 weeks prior to killing frost.

Tank Mixture

Herbicide tank mix partner	Crops registered	Rate of herbicide tank mix partner	Leaf stage
2,4-D amine 500	Barley, spring wheat, winter wheat, rye, seedling grasses	0.34 L/acre	2 - 5 leaf stage
MCPA amine	Barley, spring wheat, winter wheat, oats	0.34 L/acre	2 - 5 leaf stage
MCPA K-salt	Barley, spring wheat, winter wheat, oats	0.44 L/acre	2 - 5 leaf stage
Sencor	Barley, spring wheat	0.11 - 0.17 L/acre	2 - 3 leaf stage
Ally Toss-N-Go	Barley, spring wheat	2.0 grams/acre	2 - 5 leaf stage

Application Information

How to Apply: With: Aircraft or ground equipment.

Water volume: Ground: Cereals, seed grasses: 45 L/ac. Corn: 90 - 140 L/ac. **Summerfallow/stubble (thistles):** 45 - 90 L/ac. Reduced tillage: 20 - 45 L/ac.

Pastures, rangeland grasses: 45 - 90 L/ac. Prior to seeding cereal (pre-seeding weed burndown): 20 - 45 L/ac. **Air:** 8 L/ac minimum.

Pressure: Air: Not above 200 kPa. **Ground:** 275 kPa. **Nozzles:** Flat fan recommended.

Application Tips

Best when crop is under good growing conditions and air temperature 10 - 25°C. Avoid application when crop is under stress from adverse environmental conditions. Do not spray if risk of frost or severe drop in night temperature is forecast. Do not use on bentgrass. Apply only at recommended crop stage, otherwise, crop damage can occur.

How it Works

Absorbed through roots and leaves and translocated in phloem and xylem, disrupting the metabolism.

Expected Results

Weeds: Results may take 10 - 14 days to appear. Proliferation of tissues in plant causes twisting, bending of stem and leaf petioles; cupping of leaves; increase in root size; increase in fibrous roots.

Crops: Shortening of straw may occur in treated crops without adverse affects on yield. If applied at other than recommended crop stage, head and stem deformities may occur. Crops under stress from adverse environmental conditions may suffer a further setback. Crop injury may be offset by weed control obtained. Poor results may be expected if it rains within 4 hours, older weeds are sprayed or insufficient water.

Restrictions

Effects of Rainfall: Rainfall more than 4 hours after application will not reduce effectiveness.

Re-cropping: When Banvel II/Oracle is applied at 1 L/ac on fallow or stubble, grow only beans (white), cereals, corn (field, sweet) or soybeans the next year. After Banvel II/Oracle (510 mL/ac) + Roundup (690 mL/ac) for thistle control, grow only beans (white), cereals, corn (field, sweet), canola or soybeans. If application is after September 1 or if soil is dry subsequent to application, crop injury may occur next spring.

Grazing restrictions: Canaryseed: Use seed only as bird seed. Cereals, seedling grasses: follow as per grazing and haying restrictions. **Corn:** Do not graze or harvest for silage until 7 days after Banvel II/Oracle alone or Banvel II/Oracle + 2,4-D Amine; at least 12 weeks after other tank mixes.

Pastures, rangeland, non-crop area (meat animals): If treated vegetation has been consumed by meat animals within 30 days of Banvel II/Oracle application, feed the animal with untreated diet for 30 days before slaughter. Meat animals may graze or feed on treated pasture 30 days after Banvel II/Oracle application without restrictions on slaughter.

Grazing and hay restrictions (dairy cattle): (Days = time between treatment and grazing or cutting.)
Up to 500 mL/ac: 0 days, 501 - 930 mL/ac: 7 days, 931 mL/ac - 1.86 L/ac: 14 days, 1.87 - 2.87 L/ac: 30 days.

Environmental Hazards

Banvel II/Oracle may cause injury to desirable trees and plants, particularly soybeans, flowers, fruit trees, grapes, ornamentals, peas, potatoes, tomatoes, tobacco, and other broadleaf plants especially in their developmental and growing stage. Leave an adequate buffer zone between treatment areas and sensitive plants.

Toxicity

Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = formulated 2,629 mg/kg. May cause mild skin irritation and extreme eye irritation and swelling. Non-toxic to fish and birds.

Storage

If frozen, shake thoroughly before use. No activity is lost if completely resuspended.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.

Basagran (bentazon)

Group 6

Manufacturer: BASF Canada



Caution Poison

1. **Formulations:** Liquid; 480 g/L (PCP# 12221); 2 x 9 L.

Basagran (cont'd)

- 2. Registered Mixes:** Basagran: Spring wheat only: 2,4-D 500 Amine or Ester, Assure II (on great northern, pink, pinto and small red beans).

Surfactants: Assist Oil Concentrate (all crops), Citowett Plus (processing peas), Super Spreader. The surfactant is not included in the package.

3. Crops:

alfalfa ^{1,2}	field corn (8.8)	orchard grass ¹	snap beans (8.1)
alsike clover ¹	field peas (8.5)	pink ³	snow peas
black beans	flax (8.8) (including low	pinto beans ³	soybeans
blueberry	linolenic acid varieties)	processing peas (8.3)	spring wheat (including under-
bromegrass ¹	great northern beans ³	red clover ¹	seeded to forage crops listed)
creeping red fescue ¹	kidney beans	sainfoin ^{1,2}	sweet clover ²
crested wheatgrass ¹	lima beans	seed corn (8.8)	sweet corn (8.8)
dry common beans (8.1)	linola	silage corn (8.8)	timothy ¹
fababeans (8.6)	meadow foxtail ¹	small red beans ³	white beans

¹ Seedling legumes and grasses for seed production only.

² Established stand for seed production.

³ The addition of ammonium sulfate at 1.5% v/v will result in more consistent weed control. Use with Assist Oil Concentrate.

4. Weeds Controlled:

annual smartweed (7.0)	common groundsel (8.5)*	lady's-thumb	shepherd's-purse (7.3)
bird rape*	common ragweed*	lamb's-quarters (6.2)*	stinkweed (7.8)
buttercup	corn spurry (7.0)	low cudweed	stork's-bill
cleavers	giant ragweed*	purslane	volunteer canola
cocklebur	hairy galinsoga	redroot pigweed (7.2)*	wild mustard (8.4)
common chickweed (7.2)	hairy nightshade (6.0)	Russian thistle (7.9)	wild radish

* Triazine resistant strains of these weeds are controlled by Basagran.

- 5. Weeds Suppressed:** Canada thistle** (single application)(4.7), field bindweed*, Russian thistle.

* Treat field bindweed before it is dark green and has begun to trail.

** Repeat application may be required for control.

6. When Used:

Beans (dry, kidney, lima, snap, white, great northern, pink, pinto and small red): 1 - 3 trifoliate leaves.

Corn: 1 - 5 leaf.

Fababeans: Soon after 3 leaf stage.

Flax: Soon after crop reaches 5 cm.

Peas (field, processing): Tolerant after 3 pairs of leaves (or 3 nodes) are present but prior to crop flowering.

Soybeans: Unifoliate - 2 expanded trifoliate leaves, usually 18 - 28 days after planting.

Spring wheat: Tolerant at any growth stage.

Seedling forage legumes (alfalfa, red clover, alsike clover, sainfoin): Tolerant after 3rd trifoliate stage.

Seedling forage grasses: Tolerant at 1 - 7 leaf stage.

Established forage legumes (Alfalfa, tolerant before crop canopy closes, prior to flowering).

Sainfoin, clover: Tolerant between 7.5 - 25 cm height.

7. How to Apply:

With: Aircraft (Basagran and Assist only) or ground equipment.

Rate:

Basagran:

910 mL/ac: All crops/weeds listed.

710 mL/ac: For control of cocklebur, lady's-thumb, wild mustard, bird rape, stinkweed or shepherd's-purse only. For Canada thistle suppression, repeat applications 7 - 15 days after application if necessary.

Safety information, see page 25

400 mL/ac: For spring wheat (not underseeded) only when tank mixed with 2,4-D Amine or Ester (470 g/L) at 300 - 400 mL/ac. This tank mix will control lady's-thumb, bluebur, burdock (<4 leaf), cocklebur, common plantain, flixweed, lamb's-quarters, mustard (except dog and tansy), prickly lettuce, redroot pigweed, Russian thistle, shepherd's-purse, stinkweed, sweet clover, volunteer canola, wild radish and wild sunflower. Application should be made at the 2 - 4 leaf stage of these weeds.

Assist: Ground: Add 400 mL of Assist per 40 litres of water with a maximum rate of 810 mL/ac. Reduce Assist to 400 mL/ac under hot, humid conditions. Air: Add 50 - 100 mL/ac of Assist. Do not use Assist in excess of 100 mL/ac as substantial crop injury could occur.

Water volume: Air: 20 - 40 L/ac. Ground: 40 - 160 L/ac.

Pressure: Air: 275 kPa minimum. Ground: 275 - 425 kPa.

Nozzles: Flat fan or hollow cone only recommended. Tilt 45° forward to ensure better coverage.

Note: Basagran Forte is not registered for aerial application.

8. **Application Tips:** Do not apply to crops that have been stressed (e.g. hail damage, flooding, drought, widely fluctuating temperatures, prolonged cold weather) as crop injury may result. Best results are when weeds are young and actively growing. Apply Basagran when broadleaf weeds are small and actively growing and before the weeds reach the maximum size recommended for treatment. Apply Basagran to stork's-bill at the 2 - 6 leaf stage and to cleavers at the 1 - 3 whorl stage. Basagran should be applied when the main weed of concern is in the suggested growth stage for treatment.

Band spraying: Spray minimum of 25 cm wide band. Minimize the amount of dust striking target weeds to ensure adequate coverage and penetration. Do not use cultivation equipment when spraying. Adjust the Basagran rate to proportion of the total area to be sprayed.

9. **How it Works:** Contact herbicide which interferes with photosynthesis. In resistant plants, metabolized to a non-toxic material. Uptake into the plant occurs primarily through the leaves. Thorough coverage of foliage is important for consistent weed control.

10. Expected Results:

Weeds: Weeds turn yellow initially and then brown, usually within 2 weeks.

Crops: Yellowing, bronzing, speckling or burning occurs sometimes. The crop usually outgrows the condition within 10 days. **Poor results may be expected when** weeds are beyond recommended growth stage, when spray coverage is poor or under poor growing conditions (cool weather conditions or drought).

11. **Effects of Rainfall:** Rainfall within 6 - 8 hours of application may reduce activity.

12. **Movement in Soil:** Bentazon is not adsorbed to soil particles but is rapidly incorporated into the soil organic matter by microorganisms. Does not leach below plow layer.

13. Cropping Restrictions:

Drift: Avoid drift onto susceptible crops such as adzuki and mung beans, cucumbers, lentils, mustard, rapeseed, sugar beets and sunflowers.

Grazing restrictions: Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.

Succeeding crops: No restrictions.

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = technical 1,100 mg/kg. Slightly toxic to fish. Non-toxic to birds and bees.

15. **Precautions, First Aid:** Check label for first aid information.

16. **Storage:** Store in a heated place, freezing will not affect activity. If frozen, warm to room temperature and shake well.

17. **Resistance Management:** See page 41 for information on resistance management.

Basagran Forte (bentazon)

Manufacturer: BASF Canada

Group 6



Warning Poison

- 1. Formulations:** Liquid; 480 g/L (PCP# 22006); 2 x 10.
- 2. Registered Mixes:** Solo (**on dry beans only**, 12g/ac + 809 mL/ac of 28% UAN – nitrogen source).
- 3. Crops:** All dry beans, kidney bean, white bean, grain corn, silage corn, sweet corn, seed corn), flax (including low linolenic acid), forages, field peas, processing peas, soybeans, fababeans, otebo beans.

4. Weeds Controlled:

annual smartweed (7.0)	common groundsel (8.5)*	lady's-thumb	spiny annual sow thistle**
bird rape*	common ragweed*	lamb's-quarters (6.2)*	stinkweed (7.8)
buttercup	corn spurry (7.0)	low cudweed	volunteer canola**
cleavers	giant ragweed*	purslane	wild mustard (8.4)
cocklebur	hairy galinsoga	shepherd's-purse (7.3)	wild radish
common chickweed (7.2)	hairy nightshade (6.0)		

* Triazine resistant strains of these weeds are controlled by Basagran Forte.

** In field peas only – .4 L/ac for volunteer canola; .5 L/ac for spiny annual sow thistle (suppression only, up to 4 leaf stage for weed.)

- 5. Weeds Suppressed:** Canada thistle (4.7), field bindweed*, redroot pigweed, Russian thistle.

* Treat field bindweed before it is dark green and has begun to trail.

6. When Used:

Beans (dry, kidney, white): 1 - 3 trifoliate leaves.

Corn: 1 - 5 leaf.

Forages: 3 - 8 leaf stage before closure of crop canopy.

Flax: Soon after crop reaches 5 cm.

Peas (field, processing): Tolerant after 3 pairs of leaves (or 3 nodes) are present but prior to crop flowering.

Soybeans: Unifoliate - 2 expanded trifoliate leaves, usually 18 - 28 day after planting.

Fababeans: Soon after 3 leaf stage.

7. How to Apply:

With: Ground equipment.

Rate: 910 mL/ac: All crops/weeds listed.

710 mL/ac: For control of cocklebur, lady's-thumb, wild mustard, bird rape, stinkweed or shepherd's-purse only. For Canada thistle suppression, repeat applications 7 - 15 days after application if necessary. Only once per year for otebo beans.

Water volume: 40 - 160 L/ac.

Pressure: 275 - 425 kPa.

Nozzles: Flat fan or hollow cone only recommended. Tilt 45° forward to ensure better coverage.

Note: Basagran Forte is not registered for aerial application.

- 8. Application Tips:** Do not apply to crops that have been stressed (e.g. hail damage, flooding, drought, widely fluctuating temperatures, prolonged cold weather) as crop injury may result. Best results are when weeds are young and actively growing. Apply Basagran Forte when broadleaf weeds are small and actively growing and before the weeds reach the maximum size recommended for treatment. Basagran Forte to cleavers at the 1 - 3 whorl stage. Basagran should be applied when the main weed of concern is in the suggested growth stage for treatment.

- 9. How it Works:** Contact herbicide which interferes with photosynthesis. In resistant plants, metabolized to a non-toxic material. Uptake into the plant occurs primarily through the leaves. Thorough coverage of foliage is important for consistent weed control.

Safety information, see page 25

10. Expected Results:

Weeds: Weeds turn yellow initially and then brown, usually within 2 weeks.

Crops: Yellowing, bronzing, speckling or burning occurs sometimes. The crop usually outgrows the condition within 10 days. **Poor results may be expected when** weeds are beyond recommended growth stage, when spray coverage is poor or under poor growing conditions (cool weather conditions or drought).

11. Effects of Rainfall: Rainfall within 6 - 8 hours of application may reduce activity.

12. Movement in Soil: Bentazon is not adsorbed to soil particles but is rapidly incorporated into the soil organic matter by microorganisms. Does not leach below plow layer.

13. Cropping Restrictions:

Drift: Avoid drift onto susceptible crops such as adzuki and mung beans, cucumbers, lentils, mustard, rapeseed, sugar beets and sunflowers.

Grazing restrictions: Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.

Succeeding crops: No restrictions.

14. Toxicity: Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = technical 1,100 mg/kg. Slightly toxic to fish. Non-toxic to birds and bees.

15. Precautions, First Aid: Check label for first aid information.

16. Storage: Store in a heated place, freezing will not affect activity. If frozen, warm to room temperature and shake well.

17. Resistance Management: See page 41 for information on resistance management.

Benchmark (florasulam + bromoxynil)

Group 2, 6

Manufacturer: Dow AgroSciences Canada Inc.

- 1. Formulations:** Benchmark A: 50 g/L florasulam (PCP# 28787) + Benchmark B: 235 g/L bromoxynil (PCP# 25341); 1.6 L jug Benchmark A + 2 x 9.71 L Benchmark B; 4 x 8 L Benchmark A + 4 x 97.1 L drum Benchmark B.
- 2. Registered Mixes: Spring and durum wheat:** Horizon (95 mL/ac) + Score adjuvant, Puma¹²⁰ Super (312 mL/ac for wild oats, barnyard grass and green foxtail; for green foxtail only 156 mL/ac). Simplicity (200 mL/acre) for control of wild oats, suppression of green foxtail and labeled broadleaf weeds.
- 3. Crops:** Barley, spring wheat (including durum).
- 4. Weeds Controlled:**

American nightshade	common ragweed	pale smartweed	tartary buckwheat
bluebur	cow cockle	redroot pigweed	velvet leaf
cleavers	green smartweed	Russian thistle***	volunteer canola*
cocklebur	lamb's-quarters	shepherd's-purse	wild buckwheat
common chickweed	kochia**	stinkweed	wild mustard
common groundsel	lady's-thumb		

* including herbicide tolerant canola varieties except Clearfield.
** Apply before plants are 5 cm high.
*** Apply before plants are 8 cm high.
- 5. Weeds Suppressed:** Annual sow thistle, hemp-nettle, perennial sow thistle*.
* Applications made at advanced leaf stages will reduce product effectiveness.

Benchmark (cont'd)**6. When Used:**

Crop stage: 2 - 6 leaf stage of barley and wheat including durum.

Weed stage: 2 - 4 leaf stage and up to 8 leaf stage for common groundsel, lamb's-quarters and tartary buckwheat.

- 7. How to Apply: With:** Ground equipment only. With a sprayer that can apply 40 L/ac spray solution. Do not apply by air.

Rate: Florasulam 50SC: 40 mL/ac, Bromoxynil 235EC 485 mL/ac.

Water Volume: 40 L/ac.

Pressure: Use low pressure 200 - 275 kPa.

Mixing instructions: See page 12, filling method "b".

Sprayer cleanup: See page 16, method A.

- 8. Application Tips:** Do not apply to crops underseeded with legumes. Apply florasulam + bromoxynil tank mix to main flush of broadleaf weeds. Apply when weeds are actively growing (2 - 4 leaf stage). Warm, moist conditions that promote active weed growth, small weed size, competitive crop and good growing conditions after application will optimize the weed control. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed, and regrowth may occur. For best results, ensure adequate spray coverage of target weeds. Only weeds that have emerged at time of application will be controlled. If foliage of the weed is wet at time of application, control may be reduced.
- 9. How it Works:** The florasulam component inhibits the ALS enzyme in plants, resulting in a rapid halt in growth followed by yellowing and reddening of the foliage, followed by death of susceptible weeds. The bromoxynil portion is a contact herbicide that inhibits photosynthesis and plant respiration causing plant death.
- 10. Expected Results:** Weeds susceptible to florasulam will stop growing almost immediately. The weeds turn yellowish or reddish. Symptoms such as yellowing or red coloration may not be noticeable for 1 or 2 weeks. Small burnt spots on leaves of weeds susceptible to bromoxynil can appear within hours. Warm, moist conditions, small weed size and competitive crop will optimize weed control provided by Benchmark tank mix.
- 11. Effects of Rainfall:** Heavy rainfall immediately after application may wash the chemical off the foliage, and repeat treatment may be required. Do not apply if rainfall is forecast for time of application.
- 12. Movement in Soil:** Florasulam is not persistent in the soil. Field studies in a wide variety of soils have shown that the half life of florasulam in soil is 2 to 18 days. Florasulam degradation is not affected by soil type or by soil pH, but is moisture and temperature dependent. Florasulam is somewhat soluble in water but is generally not mobile in soil under typical prairie conditions. Bromoxynil is not mobile in soil.
- 13. Cropping Restrictions:**
- Grazing restrictions:** Do not graze or cut treated crop for hay within 30 days of application. Do not harvest the treated crop within 60 days of application.
- Drift:** Do not allow spray mist to drift since drift can cause damage to non-target crops and plants. Do not apply when winds are gusty or in excess of 15 km/h. When spraying, avoid combinations of pressure and nozzle type that will result in fine particles (mist), which are more likely to drift.
- Succeeding crops:** Fields treated with Benchmark herbicide tank mix can be seeded to barley, canola, peas, wheat or summerfallowed. Do not seed crops other than those listed for at least one year after treatment. For more cropping and use information, contact your Dow AgroSciences Canada Inc. representative.
- 14. Toxicity:** Florasulam 50 SC has an extremely low acute toxicity. Acute $LD_{50} = >6,000$ mg/kg. Bromoxynil 235 EC has moderate toxicity. Acute $LD_{50} = >500$ mg/kg. Intake of a large dose may cause convulsions, sudden collapse or coma. It can be adsorbed through the skin. It is very toxic to fish.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Store away from food, feedstuff, fertilizer, seeds, insecticides, fungicides or other herbicides. Store in dry, heated storage. If products are frozen, bring up to room temperature and agitate before use. Soak up small amounts of spill with absorbent clay.
- 17. Resistance Management:** See page 41 for information on resistance management.

Safety information, see page 25

Betamix/Betamix β

(phenmedipham + desmedipham)

Group 5

Manufacturer: Bayer CropScience Inc.

1. **Formulations:** Emulsifiable concentrate; **Betamix:** 75 g/L phenmedipham + 75 g/L desmedipham (PCP# 19652); 10 L bottle. **Betamix β :** 153 g/L phenmedipham + 153 g/L desmedipham (PCP# 28650); 10 L bottle.
2. **Registered Mixes:** Herbicide 273.
3. **Crops:** Sugar beet.
4. **Weeds Controlled:**

green foxtail	mustard	redroot pigweed	wild buckwheat
kochia	nightshade	stinkweed	yellow foxtail
lamb's-quarters	ragweed		
5. **Weeds Suppressed:** None.
6. **When Used:** Early post-emergence when weeds are early cotyledon to 4 leaves. Do not commence spray application until mid-afternoon.
7. **How to Apply:**

With: Ground equipment as a band or broadcast treatment.

Rate: Betamix: 1.0 - 4.45 L/ac, Betamix β : 0.47 - 1.9 L/ac. Select rate based upon formulation used as a broadcast equivalent in a maximum of 42 litres of water for each litre of Betamix. Use low rate on early cotyledon beets and high rate on beets with at least 4 fully expanded leaves. Repeat application for improved weed control.
8. **Application Tips:** Avoid spraying until mid-afternoon when daytime temperatures will exceed 22°C. High humidity increases efficacy. Best results are obtained with repeat applications of the lowest rate commencing when the first weeds emerge.
9. **How it Works:** Absorbed through leaves. Sharply inhibits rate of assimilation of CO₂ in treated plants within 6 hours. Resistant species (sugar beets) begin recovery in this time while susceptible species do not.
10. **Expected Results:** Under warm conditions, weed kill is complete in 4 - 7 days. Cool conditions require longer periods of up to 2 weeks.
11. **Effects of Rainfall:** Rainfall within 6 hours of application may reduce weed kill.
12. **Movement in Soil:** Very little leaching occurs.
13. **Cropping Restrictions:**

Grazing restrictions: Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.
14. **Toxicity:** Acute oral LD₅₀ phenmedipham (rat) = 8,000 mg/kg. Acute dermal LD₅₀ phenmedipham (rat) = 4,000 mg/kg. Acute oral LD₅₀ desmedipham (rat) = >10,250 mg/kg. Toxic to fish - avoid contamination of water supply.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Do not store below 0°C.
17. **Resistance Management:** See page 41 for information on resistance management.

Broadband (*pinoxaden + florasulam*)

Group 1,2

Manufacturer: Syngenta Crop Protection Canada Inc.

1. Formulations: 92.7 g/L pinoxaden, 7.7 g/L florasulam (PCP# 29138); 10L, 80L, 10.53L + 11.3L(Adigor) and 84.24L + 90.4 L (Adigor).

2. Registered Mixes: MCPA Ester, Curtail M, Tilt 250E.

3. Crops: Barley and spring wheat (excluding durum).

4. Weeds Controlled:

barnyard grass	lady's-thumb	stinkweed	wild buckwheat
cleavers	proso millet	volunteer canary seed	wild mustard
common chickweed	shepherd's-purse	volunteer canola	wild oats
green foxtail	smartweed	volunteer oats	yellow foxtail

5. Weeds Suppressed: Redroot pigweed, hemp-nettle, annual sow thistle, perennial sow thistle.

6. When Used: **Grassy weeds:** 1 - 6 leaf, prior to 4th tiller. **Broadleaf weeds:** 1 - 6 leaf stage.

Crop: 1 leaf to flag leaf stage.

7. How to Apply:

With: Ground equipment only.

Rate: Apply at 263 mL/ac Broadband + 283 mL/ac of Adigor adjuvant.

Water: 20 - 40 L/ac.

Nozzles: 80° or 110° flat fan nozzles are recommended. Use 50 mesh nozzle screens.

Pressure: 275 - 310 kPa.

Do not tank mix with any other adjuvant, chemical additives, pesticides or fertilizers unless recommended on the label.

8. Application Tips: For optimum results, apply Broadband herbicide to actively growing weeds. Weeds emerging after application of Broadband will not be controlled. Do not apply to crops stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result.

9. How it Works: Broadband herbicide is absorbed by the leaves and is rapidly translocated to the growing points of leaves and stems of target weeds. It must be applied early post emergence to the main flush of actively growing annual broadleaf and grass weeds. Thorough coverage of the plants is essential for consistent control.

10. Expected Results: Broadband is a systemic, post-emergence herbicide. It is absorbed by leaves and is rapidly translocated to the growing point of leaves and stems of target weeds. Thorough coverage of the plants is essential for consistent control. Broadband herbicide stops growth of susceptible weeds rapidly. Actively growing, susceptible grass and broadleaf weeds stop growing within 48 hours of treatment; however, typical symptoms (discolouration) of dying broadleaf weeds may not be noticeable for 1 to 2 weeks after application. Depending on species, growing conditions and crop competition, leaves and growing points of annual grass weeds turn yellow within one to three weeks after application. Further colour changes and loss of vigour will be observed, followed by a browning and control three to five weeks after application. Degree of control and duration of effect are dependent on weed sensitivity, spray coverage, weed size, crop competition and growing conditions at and following treatment.

11. Effects of Rainfall: Broadband alone can be used one hour before rainfall.

12. Movement in Soil: Pinoxaden is not mobile in the soil, and florasulam has limited mobility due to rapid microbial breakdown and soil adsorption.

13. Cropping Restrictions: On fields sprayed with Broadband, no crop may be seeded until the following year. There are no crop rotation limitation the year following application of Broadband.

Preharvest interval: 60 days after treatment for grain and straw, 30 days after treatment for hay.

Grazing restrictions: Wait a minimum of 7 days before grazing livestock on treated crops.

Safety information, see page 25

14. **Toxicity:** Broadband herbicide contains materials that may cause severe pneumonitis if aspirated.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Store the product in closed, original container in a well ventilated room. Keep out of reach of children, unauthorised persons and animals. Store separate from food, feed and fertilizer.
17. **Resistance Management:** See page 41 for information on resistance management.

Buctril M/Mextrol 450/Badge/Logic M (bromoxynil + MCPA)

Group 6,4

Manufacturer: Bayer CropScience/Nufarm Agriculture/MANA Canada/Interprovincial Co-operatives



Warning Poison

1. **Formulations:** Emulsifiable concentrate; **Buctril M:** 280 g/L bromoxynil + 280 g/L MCPA (PCP# 18022); 8L jugs, 128L. **Mextrol 450:** 225 g/L bromoxynil + 225 g/L MCPA Ester (PCP# 26999); 2 x 10L jugs, 100L, 450L. **Badge:** 225 g/L bromoxynil + 225 g/L MCPA (PCP# 16164); 10L jug, 500L tote. **Logic M:** 225 g/L bromoxynil + 225 g/L MCPA (PCP# 28109); 2 x 10L jugs.
2. **Registered Mixes:** **Spring wheat, durum wheat, winter wheat:** Achieve Liquid, Ally, Avenge, Axial + Adigor, Everest, Horizon, MCPA Amine, Ester, K-salt, Puma¹²⁰ Super, Refine SG, Puma¹²⁰ Super + Refine SG. **Barley:** Achieve Liquid, Ally, Avenge, Axial + Adigor, MCPA Amine, Ester, K-salt, Puma¹²⁰ Super, Refine SG, Puma¹²⁰ Super + Refine SG. **Oats:** MCPA Amine, Ester, K-salt. **Flax (including low linolenic acid varieties):** Fusion, Poast Ultra, Select, Centurion, Arrow 240. **Corn:** Atrazine.

Buctril M, Mextrol 450/Badge/Logic M are liquid herbicides recommended in tank mixes with other products; follow all instructions for mixing, spraying precautions, limitations, crop rotations, application timing, preharvest intervals, etc. on labels of products tank mixed with Buctril M, Mextrol 450 liquid herbicide, Badge and Logic M.

Mixing restrictions: applies to Buctril M/Mextrol 450/Badge/Logic M. **Ally:** add 1/2 amount of water to tank, add Ally, agitate, add rest of water, add Buctril M etc. and then surfactant. **Atrazine:** add Atrazine (450 - 910 g active/ac) to tank first. Do not add oil or surfactant. Observe precautions and limitations of both labels. **Avenge:** add 1/2 of the water, add Buctril M etc., add rest of water, add Avenge. **MCPA:** add 1/2 of the water, add MCPA, agitate, add rest of water, add Buctril M etc. **Liquid Achieve, Bison, Marengo:** refer to Liquid Achieve, Bison, Marengo write-up for mixing instructions. **Select, Centurion, Arrow 240:** prepare Buctril M etc. mix, then add Select, Centurion, Arrow 240 plus adjuvant. **Horizon NG, Nextstep, Foothills, Signal, Ladder:** add Buctril M etc., then add Horizon, then add adjuvant. **Puma¹²⁰ Super, Puma Advance, Wildcat, Cordon, Bengal:** add Buctril M etc., then add Puma¹²⁰ Super, Puma Advance, Wildcat, Cordon, Bengal.

3. Crops:

barley (8.8)	field corn (9.0)	perennial cereal rye*	sweet corn (9.0)
canary seed (8.5)	flax (8.4)	solin (low linolenic flax)	winter wheat (8.8)
durum wheat (8.6)	oats (8.8)	spring wheat (8.6)	(fall or spring applied)
fall rye			

* Buctril M only.

Seedling grasses (for seed)

bromegrass (8.9)	meadow foxtail	slender wheatgrass (8.5)
creeping red fescue (8.7)	orchard grass (8.9)	tall fescue
crested wheatgrass (8.5)	reed canary grass	tall wheatgrass (8.5)
intermediate wheatgrass (8.5)	Russian wild rye (9.0)	timothy (8.5)
meadow fescue (8.3)		

Established grasses

timothy (for seed or hay)

Underseeding: Legumes not recommended.

Safety information, see page 25

Buctril M/Mextrol 450/Badge/Logic M (cont'd)**4. Weeds Controlled:**

American nightshade	green smartweed	shepherd's-purse (6.0)
ball mustard	kochia (6.7)	stinkweed (8.9)
bluebur	lady's-thumb	tartary buckwheat (8.5)
cocklebur	lamb's-quarters (8.6)	volunteer rapeseed (8.7)
common buckwheat	night-flowering catchfly (7.8)	volunteer sunflower
common groundsel	pale smartweed (8.2)	wild buckwheat (8.1)
common ragweed	redroot pigweed (7.9) (except flax)	wild mustard (8.4)
cow cockle (7.8)	Russian thistle (7.1)	wild tomato
flixweed (5.7)	scentless chamomile (7.2) (seedlings only)	wormseed mustard

5. Weeds Suppressed: Canada thistle (4.9), perennial sow thistle, prickly lettuce (winter wheat only, Buctril M).

6. When Used:**Crop stage:**

Barley, oats and wheat: 2 leaf to early flag leaf.

Winter wheat, fall rye: 2 - 4 leaf in the fall or after growth begins in the spring, but prior to flag leaf.

Canary seed: 3 - 5 leaf. Flax: 5 - 10 cm. Corn: 4 - 6 leaf.

Seedling grasses: 2 - 4 leaf (establishment year only, not underseeded to legumes).

Established timothy (for hay): 3 - 6 leaf stage.

Weed stage:

Weeds controlled up to 4 leaf stage: American nightshade, bluebur, ball mustard, cocklebur, cow cockle*, flixweed, green smartweed, lady's-thumb, night-flowering catchfly, redroot pigweed, Russian thistle**, scentless chamomile***, shepherd's-purse, volunteer rapeseed, volunteer sunflower.

Weeds controlled up to 8 leaf stage: Canada thistle (top growth), common buckwheat, common groundsel, common ragweed, lamb's-quarters, pale smartweed (seedlings), perennial sow thistle (top growth), stinkweed, tartary buckwheat, wild buckwheat, wild mustard, wild tomatoes (up to 6 leaf stage) wormseed mustard.

* In normal conditions, cow cockle will be controlled up to the 4 leaf stage. Plants beyond this stage are unlikely to be controlled.

** Spray before plants are 5 cm high.

*** Spring annuals only.

7. How to Apply:

With: Aircraft (wheat, barley and oats only) or ground equipment.

Rate: 400 mL/ac (Buctril M); 500 mL/ac (Mextrol, Badge, Logic M).

Water volume: Air: 8 L/ac or more. Ground: 20 L/ac or more. Corn: 80 - 120 L/ac.

Seedling grasses: 60 L/ac; Established timothy: 60 L/ac.

Pressure: 275 kPa.

Nozzles: Flat fan recommended. Hollow cone (air only).

8. Application Tips: Avoid spraying during a severe drought. Under conditions of high temperature and humidity, slight discolouration of cereals may occur but no effect on crop yields. Flax is less tolerant than cereals; therefore, do not spray flax in hot humid weather when daytime temperatures are over 25 - 29°C. Best results are achieved when weeds are sprayed in seedling stage, with good spray coverage. Corn: Buctril M at 400 mL/ac (or Mextrol/Badge/Logic M at 500 mL/ac) as an overall spray only up to 6 leaf stage. Buctril M + Atrazine (or Mextrol/Badge/Logic M + Atrazine) for a broader spectrum of weed control. Cultivation after application is not recommended.

9. How it Works: Bromoxynil is a contact type herbicide; therefore, good spray coverage is essential. Inhibits photosynthesis and plant respiration. MCPA is absorbed through leaves and is readily translocated in the plant.

10. Expected Results: Small burnt spots on the leaf can appear within hours, death takes up to 2 weeks.

Poor results may be expected if poor coverage. Poor penetration through crop canopy.

11. **Effects of Rainfall:** Rainfall within 1 hour of application may reduce weed control.
12. **Movement in Soil:** Readily leached from soil. Longer residual in dry soil.
13. **Cropping Restrictions:**
Succeeding crops: No restrictions.
Grazing restrictions: Do not graze or harvest for greenfeed until 30 days after treatment.
Post harvest interval: Flax = 60 days.
14. **Toxicity:** High acute mammalian toxicity. Very toxic to fish and birds. Non-toxic to bees. May cause burns and may be absorbed through the skin.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Buctril M formulations will solidify at temperatures below -20°C but will become useable at temperatures above 0°C.
17. **Resistance Management:** See page 41 for information on resistance management.

Calmix Pellets (bromacil + 2,4-D)

Manufacturer: Nufarm Agriculture Inc.

Group 5,4



Caution Poison

1. **Formulations:** 3.0% bromacil + 5% 2,4-D (PCP# 9342); 1 kg, 5 kg bags.
2. **Registered Mixes:** None.
3. **Crops:** Non-crop areas only.
4. **Weeds Controlled:** Non-selective.
5. **Weeds Suppressed:** Not applicable.
6. **When Used:** May be applied during the growing season, but to prevent growth, apply in fall or early spring.
7. **How to Apply:**

With: Calmix spreader or shaker.

Rate: Apply higher rate to heavier soils and/or to extend the growth control period.

Weeds	Calmix Pellets kg/100 m ²
Annual weeds and perennial seedlings	2.5
Heavy perennial growth	4.5
Shallow-rooted perennials	3.75

Spot treatment Calmix: 37.5 g to about 1 m². Repeat treatment when required. Around utility poles, treat 1.25 m around each pole, 225 g Calmix/pole.

8. **Application Tips:** Do not use near lawns or flower beds. Do not use in residential areas. **Do not apply closer than 1.3 times the height of desirable trees, ornamentals or plants.** Roots from plants or trees may extend beneath areas to be treated. Be cautious where trees are in close proximity to the treatment site. Do not apply on slopes where water erosion may carry chemical onto areas of desirable vegetation. Do not contaminate water used for irrigation or other domestic uses. Do not apply more than 4.5 kg/100 m² of Calmix per year.
9. **How it Works:** Systemic action, enters plant via roots.

Calmix Pellets (cont'd)

10. **Expected Results:** Vegetation turns brown and dies. No new growth will appear, resulting in bare ground. Rapidity and duration of control will depend upon amount of chemical applied, soil type and environmental conditions. **Poor results may be expected if** inadequate application rates, soil erosion removes chemical from treated area when applied on slopes or insufficient rainfall to activate chemical.
11. **Effects of Rainfall:** Moisture will activate and carry the herbicide into the root zone.
12. **Movement in Soil:** Once fixed in the soil, there is very little lateral movement. Pellets and granular can be carried by erosion.
13. **Cropping Restrictions:** Use on non-crop areas only.
Grazing restrictions: Use on non-crop areas only.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) = bromacil 5,200 mg/kg; 2,4-D = 375 mg/kg. Slightly toxic to fish. Non-toxic to birds. May cause burns and may be absorbed through the skin.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Store in tightly closed containers away from feeds, fertilizer, plants or foodstuffs.

Casoron (*dichlobenil*)**Group 20**

Manufacturer: Chemtura Canada Co./United Agri Products Canada Inc. (distributor)

1. **Formulations:** Granular; 4%; 2 kg, 3 kg shaker jug (PCP# 23767); 15 kg bag.
2. **Registered Mixes:** None.
3. **Crops:**

arbor vitae	established fruit trees*	linden	roses
ash	honeysuckle	maple	saskatoons
caragana shelterbelts	juniper	non-crop areas	white cedar
crabapple	lilac	raspberries	willow
cutleaf weeping birch			

* Apple, cherry, peach, pear, plum at least 1 year old.

4. **Weeds Controlled:**

annual bluegrass	foxtail	mustard	shepherd's-purse
artemisia*	groundsel	pigweed	smartweeds
bindweed*	horsetail	plantain	sow thistle
Canada thistle*	knotweed	purple loosestrife	spurge
chickweed	kochia	purslane	vetch*
dandelion*	lamb's-quarters	quackgrass*	wild buckwheat*

* Controlled with higher rates with late fall application.

5. **Weeds Suppressed:** None.6. **When Used:** For best results apply when soil temperatures are cool.

Annual weeds: Apply to prepared weed-free soil either in early spring before seeds of annuals germinate or after cultivation has removed weeds. Do not apply until 4 weeks after transplanting tolerant crops.

Perennial weeds: Apply in fall (October 15 until soil freeze-up) on crops established for at least 1 year. Quackgrass and artemisia in established woody ornamentals, apply in fall and again in the early spring before May 1.

Safety information, see page 25

Casoron (cont'd)

Raspberries: Apply in late fall but before soil freeze-up. Do not cultivate or work into the soil. Do not apply in spring as injury may occur.

7. How to Apply:

With: Ground granular applicator.

Rate: Annual weeds: 45 - 70 kg/ac, based on area actually treated.

Quackgrass, artemisia in woody ornamentals: 60 kg/ac in fall; 60 kg/ac again in spring.

Quackgrass, thistles, bindweed in woody ornamentals: 91 - 111 kg/ac.

Raspberries: 71 kg/ac.

8. Application Tips: Do not use on light sandy soils with less than 2% organic matter. Do not use on fir, hemlock, spruce, Mugho pine or on herbaceous perennials. Do not use in seedbeds, transplant, or cutting beds or in greenhouses. Do not apply until 6 months after rooting of cuttings in the field.

9. How it Works: Snow melt or rain moves Casoron into the soil. Casoron inhibits germination but acts primarily on growing points and root tips.

10. Expected Results: Growth of emerging shoots of some perennials controlled. Tolerant crops are unaffected if roots do not come in contact with Casoron in the upper layers of the soil.

11. Effects of Rainfall: If it is dry, poor results can be expected.

12. Movement in Soil: Some movement in coarse-textured soils.

13. Cropping Restrictions: Do not transplant into treated soil for 1 year. Do not plant vegetables or other sensitive crops the year following treatment.

Grazing restrictions: Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.

14. Toxicity: Very low mammalian toxicity. Acute oral LD₅₀ (rats) = 3,160 mg/kg. Slightly toxic to fish.

15. Precautions, First Aid: Check label for first aid information.

16. Storage: Dry storage - not affected by frost.

CleanStart (carfentrazone + glyphosate)

Group 9,14

Manufacturer: Nufarm Agriculture Inc.

1. Formulations: Aim EC: 240 g/L carfentrazone-ethyl (PCP# 28573); 0.6 L, 4 x 3.38 L. **Credit:** 356 g/L glyphosate, formulated as isopropylamine salt (PCP# 25866); 2 x 10 L, 450 L.

2. Registered Mixes: None.

3. Crops: Preseed burndown application, prior to seeding: Canola, cereal grains, chickpea, drybean, flax, fruiting and cucurbit vegetables, lentil, mustard species, pea, safflower, succulent bean, sunflower.

4. Weeds Controlled: Weeds controlled up to 10 cm, unless specified, include:

chickweed	kochia	round-leaf mallow	tansy mustard
dandelion (spring germinated)	lamb's-quarters	Russian thistle	velvetleaf
field pennycress	morning glory (3 leaves)	shepherd's-purse	volunteer canola (all types)
horsetail	pigweed species	smartweed	

5. Weeds Suppressed: None.

CleanStart (cont'd)**6. When Used:**

Crop stage: Preseed burndown.

Weed stage: Up to 10 cm tall or as specified; thorough coverage of the weed is essential for control.

7. How to Apply:

With: Ground equipment only.

Rate: Aim: 15 mL/ac. **Credit:** 0.5 L/ac. One case of CleanStart treats 40 acres. Make only one application per year.

Water volume: Minimum 40 L per acre.

Pressure: 30 to 40 psi (200 to 275 kPa).

Nozzles: Use nozzles that deliver higher volumes and a fine to medium droplet.

8. Application Tips: Good growing conditions promote weed growth and enhance the activity of CleanStart. Weeds hardened off by cold weather or drought stress may not be controlled. Insufficient water volumes or coarse sprays may also reduce control levels.

9. How it Works: Credit is a non-selective herbicide that moves through the foliage into the roots and kills the entire plant. Aim EC is a contact herbicide; therefore, coverage of the weeds is essential for control.

10. Expected Results: Symptoms appear very rapidly (a few hours under bright conditions). Leaves of weeds take on a water-soaked appearance, followed by wilting and necrosis. Complete death occurs within a few days.

11. Effects of Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

12. Movement in Soil: The amount of leaching is very low.

13. Cropping Restrictions: None.

14. Toxicity: Credit: Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) = 4,320 mg/kg. Eye irritant. Non-toxic to bees, birds and fish. **Aim EC:** Very low acute mammalian toxicity. Acute Oral LD₅₀ (rats) = 4,077 mg/kg.

15. Precautions, First Aid: Check label for first aid information.

16. Storage: Not for use or storage in or around the home. Store in a cool, dry place and avoid excess heat. Store away from other pesticides, fertilizers, water, seed, food or animal feeds.

17. Resistance Management: See page 41 for information on resistance management.

Curtail M (*clopyralid + MCPA ester*)

Group 4**Manufacturer: Nufarm Agriculture Inc.****Caution Poison**

1. Formulations: Emulsifiable concentrate; 50 g a.e./L; clopyralid, + 280 g a.e./L MCPA Ester (PCP# 22764); 2 x 8 L jug.

2. Registered Mixes:

Barley, spring wheat, durum wheat: Achieve Liquid (200 mL/ac) + Turbocharge adjuvant, Assert 300 (0.54 - 0.67 L/ac), Puma¹²⁰ Super.

Barley, spring wheat (excluding durum): Avenge 200C, Axial, Refine Extra.

Durum wheat, spring wheat: Everest 70DF Solupak, Horizon (95 mL/ac) + Score adjuvant, Puma¹²⁰ Super (312 mL/ac for barnyard grass, green foxtail and wild oats).

Curtail M (cont'd)

- 3. Crops:** Barley, canary seed, Canada prairie soft wheat, durum wheat, flax (including low linolenic acid varieties), hard red spring wheat, oats, soft white spring wheat, timothy – established (for seed, hay and forage – **do not use on hay to be exported to Japan**), utility wheat.

Underseeding: Do not apply to crops underseeded to legumes or companion crops.

4. Weeds Controlled:

800 mL/ac

annual sow thistle (8.7)	flixweed**	redroot pigweed (7.7)	tartary buckwheat
burdock	lamb's-quarters (9.0)	Russian pigweed	volunteer canola (9.0)
Canada thistle (8.1)*	perennial sow thistle	scentless chamomile (2 - 4 leaf)	vetch
cocklebur	(top growth) (8.6)	shepherd's-purse**	wild buckwheat (8.2)
common groundsel (9.0)	prickly lettuce	smartweed (7.9)	wild mustard (9.0)
dandelion (7.4)**	ragweed	stinkweed (9.0)**	wild radish

600 mL/ac

burdock	prickly lettuce	vetch
Canada thistle (light infestations) (8.1)*	ragweed	wild mustard
cocklebur	stinkweed (spring seedlings 2 - 4 leaf) (9.0)	volunteer sunflower
flixweed (spring seedlings 2 - 4 leaf)	shepherd's-purse (spring seedlings 2 - 4 leaf)	wild radish
lamb's-quarters		

* Season-long control, with some regrowth in the fall.

** Spring rosettes only.

- 5. Weeds Suppressed:** Kochia (2 - 4 leaf).

6. When Used:

Crop stage: Barley, oats, wheat (Canada prairie soft wheat, durum wheat, hard red spring wheat, soft white spring wheat and utility): 3 leaf just before flag leaf; flax (including low linolenic acid varieties – 5 to 15 cm in height).

Weed stage: Broadleaf weeds: 1 - 4 leaf stage of growth. **Canada thistle:** 10 - 15 cm in height.

7. How to Apply:

With: Ground equipment only. Do not apply by air.

Rate: 800 mL/ac. Under low Canada thistle population and easier to control weeds – 600 mL/ac.

Water volume: 40 - 60 L/ac.

Pressure: 275 kPa.

Nozzles: Flat Fan type. Use 50 mesh or larger screens.

Mixing instructions: Clean spray tank and add 1/2 required amount of water. With agitator running, add the required amount of Curtail M. Add the remaining amount of the water and continue to agitate while spraying.

- 8. Application Tips:** When weeds are under extreme drought stress or showing effects of excessive moisture, control can be reduced or delayed. Weed escapes may occur under prolonged stress conditions or low fertility. Do not apply to weeds stressed for more than 20 days due to lack of moisture as unsatisfactory control can result. Ensure uniform spray coverage over the entire area of target weeds.
- 9. How it Works:** Clopyralid is a growth regulator type of herbicide. It is primarily absorbed through the foliage and is translocated to all parts of the plant causing leaf and stem twisting and yellowing and then death. MCPA is a systemic herbicide for broadleaf weeds which is translocated throughout the plant causing rapid undifferentiated growth, which usually results in the death of susceptible weeds.

10. Expected Results:

Broadleaf weeds: Weeds start to twist after spraying, and after twisting and bending, plants turn brown and die.

Difficult to control weeds such as Canada thistle and wild buckwheat stop growing, change colour to dark green and then turn yellow before they die. Death may not occur for 14 - 21 days after application. Some weak Canada thistle regrowth may occur by end of season.

Curtail M (cont'd)

- 11. Effects of Rainfall:** Do not apply if rain is expected in 6 hours.
- 12. Movement in Soil:** MCPA is readily leached from soil. Clopyralid is somewhat soluble in water, but it is generally not mobile in soil under typical prairie conditions.
- 13. Cropping Restrictions:**

Succeeding crops: Fields treated with Curtail M herbicide tank mix can be seeded the following year to barley, canola, corn, flax, forage grasses, mustard, oats, peas, rye, sugar beets, wheat or summerfallowed. Very dry soil conditions following application can result in a risk of injury to field peas grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive in the year of application (less than 140 mm rain between June 1 and August 31 or less than 175 mm rain in the whole year), delay seeding field peas an additional 12 months (22 months following application). Contact your local Dow AgroSciences representative or retailer for more information before seeding field peas following drought conditions in the previous year.

Do not seed crops other than those listed above for at least one year after treatment.

Grazing restrictions: Do not cut or graze treated fields of barley, oats or wheat within 7 days of application.
- 14. Toxicity:**

Clopyralid: Very low acute mammalian toxicity. Acute oral LC_{50} (rats) = >2,000 mg/kg. Acute oral LD_{50} (bees) = >100 µg/bee. Extremely toxic to fish.

MCPA: Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) = technical 700 - 880 mg/kg. Low toxicity to fish. May cause burns upon contact with skin and eyes, and it can be absorbed through the skin.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Do not ship or store near food, feed, seed and fertilizers. Store in cool (above 5°C) dry, locked, well ventilated area without floor drain. If product is frozen, bring to room temperature and agitate before use. Herbicides should be shipped or stored separately from other pesticides to avoid cross-contamination.
- 17. Resistance Management:** See page 41 for information on resistance management.

Cypress (*clodinafop-propargyl + MCPA + mecoprop-P + dicamba*)

Group 1, 4

Manufacturer: Vintara

- 1. Formulations:** Horizon WO: Emulsifiable concentrate; 240 g/L (PCP# 25477); 4.7 L Horizon + 1 x 8.1 L Score (PCP# 25476). Liquid; 275 g/L MCPA + 62.5 g/L mecoprop-p + 62.5 g/L dicamba; 10 L pack. Target (PCP# 28028).
- 2. Registered Mixes:** None.
- 3. Crops:** All types of durum and spring wheat.
- 4. Weeds Controlled:** Green foxtail, wild oats. **Broadleaf weeds:** Annual smartweeds (8.0), cow cockle (8.5), night-flowering catchfly (7.5), volunteer buckwheat, annual sow thistle, flaxweed (8.5), prostrate pigweed (8.5), volunteer mustards, ball mustards, hemp-nettle, redroot pigweed (8.5), volunteer rapeseed (9.0), chickweed, knotweed, Russian thistle (8.5), volunteer sunflowers (8.3), cleavers (7.5), kochia (8.0), shepherd's-purse, wild buckwheat (8.5), common ragweed, lady's-thumb, stinkweed (8.8), wild mustards (8.8), corn spurry (8.8), lamb's-quarters (8.7), tartary buckwheat (8.5), wormseed mustards.

Safety information, see page 25

5. Weeds Suppressed: None.

6. When Used:

Crop stage: Spring wheat including durum: 2 - 5 leaf stage.

Weed stage: Green foxtail: 1 - 5 true leaves on the main stem. For optimum control of green foxtail, apply prior to emergence of 3rd tiller and while foxtail is actively growing.

Wild oats: 1 - 6 true leaves on the main stem and prior to emergence of the 4th tiller.

Broadleaf weed stage: 2 - 5 leaf stage. Cleavers (1 - 2 whorl), hemp-nettle (before second pair of true leaves). Russian thistle (less than 5 cm).

7. How to Apply:

With: Ground equipment. Do not apply by aircraft.

Rates: Wild oats, green foxtail: Horizon 95 mL/ac + Score (0.8% v/v). Target 500 mL/ac.

Water volume: 40 L/ac.

Pressure: 275 - 310 kPa.

Nozzles: 80° or 110° flat fan stainless steel nozzles are recommended for optimal spray coverage.

Mixing instructions: See page 12, filling method "b".

Sprayer cleanup: Thoroughly clean application equipment immediately after spraying using method B. See page 16, method B.

8. Application Tips: For optimum results, apply Horizon to actively growing weeds. An early application will maximize crop yields by reducing weed competition. Application of the spray mixture at a 45° angle in the direction of travel will result in improved spray coverage. Do not use flood type nozzles, controlled droplet application equipment, spray foils or hollow cone nozzles. Weeds emerging after application will not be controlled. Do not apply to crop stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result.

9. How it Works: Horizon is absorbed by the leaves and is rapidly translocated to the growing points of leaves and stems. Thorough coverage of the plants is essential for consistent control. Actively growing wild oats and green foxtail stop growing within 48 hours after treatment. Target is a combination of 3 systemic hormonal herbicides that accumulate in the growing point of susceptible plants, producing abnormal growth and disrupting the transport system in plants.

10. Expected Results: Grassy weeds: Depending on species, growing conditions and crop competition, leaves and growing points turn yellow within one to three weeks after application. Further colour changes and loss of vigour will be observed, followed by a browning and complete control 3 - 5 weeks after application.

Broadleaf weeds: Control can take up to 7 - 14 days depending on weather and growing conditions. Leaves curl, leaf edges turn brown, petioles twist, plant ceases growth and turns brown and dies.

11. Effects of Rainfall: Rainfall within 30 minutes of application may reduce the effectiveness of Horizon WO. Target - rainfall within 3 hours will reduce activity.

12. Movement in Soil: Horizon: None. **Target** (MCPA/Mecoprop): Readily mobile in the soil.

Dicamba: Relatively mobile; mobility affected by capillary movement and/or surface evaporation. Concentration and location in the soil profile will be determined by total seasonal precipitation, its frequency and original herbicide dosage.

13. Cropping Restrictions: Do not treat wheat underseeded to forages. Cereal and broadleaf crops can be grown the year following application.

Grazing restrictions: Do not graze or harvest for livestock feed within 7 days of application. Most vegetables and fruit crops are very sensitive to drift.

Pre-harvest interval: 60 days.

Cypress (cont'd)

14. **Toxicity: Horizon:** Acute oral LD₅₀ (rats) = 2,276 mg/kg; Acute dermal (rats) = 4,000 mg/kg. Target has low acute mammalian toxicity. Acute oral LD₅₀ (rats) = MCPA 100 - 500 mg/kg; Mecoprop = 930 mg/kg; Dicamba = 2,629 mg/kg; Target = 1,600 mg/kg. Non-toxic to fish. Toxic to bees.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Heated storage only. Store the product in closed, original container in a well ventilated room.
17. **Resistance Management:** See page 41 for information on resistance management.

Deploy/Nimble *(thifensulfuron methyl + tribenuron methyl)*

Group 2

Manufacturer: Arysta LifeScience North America LLC/ Cheminova Canada Inc.

1. **Formulations:** Deploy (PCP# 29149): Dry flowable; 50% thifensulfuron methyl, 25% tribenuron methyl; 480 g jug. Nimble (PCP# 29467): Dry flowable; 50% thifensulfuron methyl, 25% tribenuron methyl; 320 g jug.
2. **Registered Mixes: Spring wheat (including durum):** Everest + 2,4-D Amine or Ester; Avenge[®] 200-C (1.4 L/ac) (spring wheat varieties on Avenge 200-C label); Horizon 240 EC (93 mL/ac) + Score surfactant (0.8% v/v); Horizon (93 mL/ac) + Score surfactant (0.8% v/v) + MCPA Ester 500 (340 - 445 mL/ac).
Spring wheat and barley(excluding durum): Curtail M (600 mL/ac) + surfactant; Lontrel (85 mL/ac) + surfactant; Lontrel (85 mL/ac) + MCPA (340 mL/ac MCPA Ester 500) + surfactant; Lontrel (85 mL/ac) + 2,4-D (283 mL/ac 2,4-D Ester LV 600) + surfactant; 2,4-D Amine (340 - 445 mL/ac Amine 500) + surfactant; 2,4-D Ester (283 - 364 mL/ac Ester LV 600) + surfactant; 2,4-D Ester (243 - 324 mL/ac LV 700) + surfactant; Attain (121 mL/ac fluroxypyr) + 2,4-D Ester (202 mL/ac) + surfactant; Banvel II (44.5 mL/ac) + surfactant; Puma¹²⁰ Super (312 mL/ac or 156 mL/ac on green foxtail only) + MCPA Ester 500 (340 mL/ac).
Spring wheat and barley (including durum): Assert[®] (526 - 648 mL/ac); Assert[®] + MCPA Ester 500; Puma¹²⁰ Super (312 mL/ac or 156 mL/ac on green foxtail only).
Spring wheat, barley and oats: MCPA (280 - 445 mL/ac MCPA Amine or Ester 500) + surfactant.
Spring wheat (excluding durum): Horizon 240 EC (93 mL/ac) + Score (0.8% v/v) + Banvel II (44.5 mL/ac).

* Do not use surfactant when tank mixing with grass herbicide unless specified on grass herbicide label.

Surfactants: Agral 90, Ag-Surf or Citowett Plus. Use a surfactant when Deploy 75 DF/Nimble is used alone or tank mixed with MCPA, 2,4-D, Curtail M or Lontrel.

3. **Crops:** Barley, oats, and wheat (spring, durum and winter).

Seedling or established grasses for forage or seed production: Meadow bromegrass, smooth bromegrass, creeping red fescue, tall fescue, orchard grass, crested wheatgrass, intermediate wheatgrass, pubescent wheatgrass, tall wheatgrass, slender wheatgrass, streambank wheatgrass, northern wheatgrass, western wheatgrass.

Established grasses for forage or seed production: Kentucky bluegrass.

Underseeding: Do not apply to crops underseeded to legumes or grasses.

4. Weeds Controlled:

Deploy 75 DF/Nimble 8g/ac alone: Ball mustard, chickweed (8.5), common groundsel, corn spurry (8.8), cow cockle (8.7), flixweed, green smartweed, hemp-nettle (8.4), kochia (8.5), lady's-thumb, lamb's-quarters (8.6), narrow-leaved hawk's-beard, redroot pigweed (8.4), Russian thistle (7.9), shepherd's-purse (8.2), stinkweed (8.6), tartary buckwheat (8.3), volunteer rapeseed (excluding smart trait) (8.6), volunteer sunflower, wild buckwheat (7.7), wild mustard (8.6).

5. Weeds Suppressed: Canada thistle (7.1), cleavers (6.7), round-leaved mallow (6.4), scentless chamomile (6.9), sow thistle, stork's-bill (6.7), toadflax (less than 15 cm tall) (7.1).

6. When Used:

Crop stage: Deploy 75/Nimble DF alone: Barley, oats, and wheat (durum, spring and winter): 2 leaf - flag leaf stage.

Deploy 75 DF/Nimble + MCPA: Barley, oats, and wheat: Full 3 leaf to expanded shot blade.

Deploy 75 DF/Nimble + 2,4-D: Barley and wheat: Full 3 leaf to expanded shot blade.

Deploy 75 DF/Nimble + Banvel: Barley and wheat: 2 leaf to 5 leaf stage.

Deploy 75 DF/Nimble + Everest: Wheat: 1 leaf to 6 leaf stage (1 to 4 leaves on main stem, plus 2 tillers).

Weed stage: Apply to young, actively growing weeds before the crop canopy closes. Weeds emerging after treatment may not be controlled. **Wild buckwheat:** Apply cotyledon to 3 leaf stage and actively growing. Large plants may regrow after application. Apply Deploy 75 DF/Nimble + Curtail M + surfactant to actively growing wild buckwheat in the cotyledon to 5 leaf stage. **Cleavers:** 1-3 whorl stage. **Stork's-bill:** 2 - 6 leaf. **Canada thistle, sow thistle:** Apply when the majority of the thistles have emerged and are actively growing. For best top growth control, apply when thistles are no larger than 15 cm tall, before bud stage and before crop canopy prevents thorough coverage of the thistles. A single application will effectively inhibit the ability of emerged thistles to compete with the crop. Later emerging thistle will not be controlled. Apply Deploy 75 DF/Nimble + Curtail M + surfactant post-emergent when the majority of the thistles have emerged and are actively growing. For best control, apply when thistles are no larger than 15 cm tall, before the bud stage and before crop canopy prevents thorough coverage of the thistles. Later emerging thistles will not be controlled. **Chickweed:** Apply when the chickweed is small (1 - 6 leaf) and actively growing, but before crop canopy prevents thorough coverage of weeds. Chickweed emerging after application will not be controlled. **Round-leaved mallow:** Apply to actively growing round-leaved mallow in the 2 - 6 leaf stage (10 - 12 cm in height). Deploy 75 DF/Nimble will keep round-leaved mallow stunted but may not reduce the overall populations. **Toadflax:** Apply when toadflax is no taller than 15 cm in height. A control program for this weed includes both frequent tillage and chemical application.

7. How to Apply:

With: Ground equipment. Do not apply by air.

Rate: Barley, oats, and wheat (durum, spring and winter): Deploy 75 DF 8g/ac.

Surfactant: 2 L/1,000 L (0.2% v/v) of spray solution.

Water volume: 22 L/ac (minimum).

Pressure: 275 kPa.

Nozzles: Flat fan type. Use 50 mesh or larger screens. Use only metal or nylon filters.

Sprayer cleanup: To avoid subsequent injury to crops other than wheat, barley or oats, immediately after spraying and prior to spraying other crops use cleaning method A on page 16.

8. Application Tips: Higher spray volumes are required for dense crop canopy and/or large weeds. Weeds should be less than 10 cm tall or across at application. Effectiveness of Deploy 75 DF may be reduced if it remains in the tank for more than 24 hours. Use Assert tank mixes within 12 hours.

9. How it Works: Absorbed through foliage. Inhibits cell development.

Deploy/Nimble (cont'd)**10. Expected Results:**

Weeds: Growth stops immediately. Discoloration of dying weeds may not be noticeable for 1 - 3 weeks after application depending on growing conditions and weed species. Poor results may be expected if there is improper mixing, timing, coverage or when weeds are under stress. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed, and regrowth may occur.

11. Effects of Rainfall: Rainfall within 4 hours of application may lessen degree of weed control.

12. Movement in Soil: Deploy 75 DF/Nimble moves little in the soil and disappears from the soil quickly.

13. Cropping Restrictions: Barley, oats and wheat may be grazed or fed to livestock 7 days after application of Deploy 75 DF/Nimble. Do not plant to any crop until 2 months after application. Do not exceed a total of 8 g/ac of Deploy 75 DF/Nimble per crop year.

14. Toxicity: Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = >5,000 mg/kg.

15. Precautions, first Aid: Check label for first aid information.

16. Storage: Store in a cool dry place.

17. Resistance Management: See page 41 for information on resistance management.

Dual II Magnum (metolachlor)

Group 15

Manufacturer: Syngenta Crop Protection Canada Inc.

1. Formulations: Emulsifiable concentrate; 915 EC (PCP# 25729); 1 x 12 L jugs.

2. Registered Mixes: May be applied as split application or tank mixed as follows. With Aatrex Liquid, Aatrex Nine-O. Liquid nitrogen - 28% nitrogen solutions or complete liquid fertilizers may replace all or part of the water for pre-plant incorporated or pre-emergent application of Dual tank mixes in corn.

Mixing restrictions: Do not tank mix with Banvel, Estemine 2,4-D. Do not impregnate on nitrate fertilizers (ammonium, potassium, sodium, calcium) or on single superphosphate (0-26-0), triple superphosphate (0-46-0) or on ammonium phosphate or on limestone. Fertilizer blends containing limestone may be impregnated. For tank mixes for crops other than corn, refer to Dual label.

3. Crops:

black spruce (second year or older)
broccoli
cabbage (transplanted)
cauliflower
corn (all types)
dry common beans
fruit trees (second year or older)
Jack pine

kidney beans
lima beans
Norway spruce (second year or older)
pinto beans
poplar (second year or older)
potatoes (except Superior)
processing peas
snap beans

red pine
soybeans
sugar beets
sweet white lupins
tomatoes (transplanted)
white beans
white pine
white spruce (second year or older)

4. Weeds Controlled: Barnyard grass, green and yellow foxtail plus weeds controlled by the second material in mix or oversprayed, American nightshade, eastern black nightshade, fall panicum, hairy crabgrass, old witch grass, smooth crabgrass, yellow nutsedge.

5. Weeds Suppressed: Redroot pigweed (pre-plant incorporated and pre-emergent treatments only).

6. When Used: Pre-plant incorporated or irrigated within 10 days if applied pre-emergent.

7. How to Apply:

With: Ground equipment: band or overall spray.

Safety information, see page 25

Dual II Magnum (cont'd)

Rate: Corn: 0.7 L/ac.

Corn: Tank mixes of Dual II Magnum at above rate plus:

Weeds controlled	Tank mixes for corn pre-plant	Split application pre-emergent (under irrigation only)
Annual grasses and broadleaf weeds	Aatrex Nine-O – 0.5 - 0.7 kg/ac	Aatrex Nine-O – 0.5 - 0.7 kg/ac
	or	or
	Aatrex Liquid – 0.9 - 1.3 L/ac	Aatrex Liquid – 0.9 - 1.3 L/ac

Water volume: 28 - 56 L/ac.

Incorporation: Incorporate to 5 cm. Do not exceed this depth since product dilution can occur. If using tandem discs, set to cut to a depth of 10 cm operated at 6 - 9 km/h. If using vibrating shank cultivators with overlapping sweeps, set 10 cm deep and operate at 10 - 13 km/h. Spike tooth or diamond tooth harrows are good incorporation equipment. Immediate incorporation is not necessary although desirable.

Pressure: 200 - 300 kPa.

Nozzles: Flat fan recommended.

8. **Application Tips:** For band treatments, use a press wheel ahead of the nozzle to level the band.
9. **How it Works:** Inhibits germination, particularly grasses.
10. **Expected Results:** Annual grasses do not germinate or under dry conditions, may die back soon after emergence.
11. **Effects of Rainfall:** Moisture required to move chemical to area of germination but an excess may move it below this area.
12. **Movement in Soil:** Some movement may occur if excess moisture on light soils.
13. **Cropping Restrictions:** Do not apply on muck, peat or high organic soils or after growth has begun. Winter cereals may be seeded 4.5 months after treatment.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) = technical 2,780 mg/kg, Dual (2,690). Prolonged exposure may cause eye injury. Slightly toxic to birds; non-toxic to fish.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Heated storage required.
17. **Resistance Management:** See page 41 for information on resistance management.

DyVel (dicamba + MCPA K-salt)

Group 4

Manufacturer: BASF Canada



Caution Poison

1. **Formulations:** Water soluble solution; 84 g/L dicamba + 336 g/L MCPA K-salt (PCP# 16545); 2 x 10 L jugs, 110 L shuttles.
2. **Registered Mixes:** Everest in spring wheat only (17.4 g/ac + Agral 90 or Ag-Surf at 0.25% v/v (eg. 2.5 L per 1,000 L spray solution). Horizon in durum and spring wheat only. (wild oats: 93 mL/ac + Score at 0.8% v/v; green and yellow foxtail: 117 mL/ac + Score at 1.0% v/v). Puma¹²⁰ Super (green foxtail: 156 mL/ac).
- Mixing instructions:** When using DyVel + Horizon, add DyVel first, followed by Horizon, then Score.
3. **Crops:** Barley (8.1), durum wheat, oats (9.0), spring wheat (8.7), winter wheat.
- Underseeding:** Legume underseeding not recommended.

Safety information, see page 25

DyVel (cont'd)**4. Weeds Controlled:**

ball mustard (8.1)	giant ragweeds	prostrate pigweed	tumble mustard (8.8)
burdock	green smartweed (7.7)	redroot pigweed (7.8)	volunteer canola (8.1)*
cocklebur	hare's-ear mustard (8.8)	Russian pigweed	volunteer sunflower
common ragweeds	hemp-nettle (6.5) (2-3 leaf)	Russian thistle (7.0)	wild buckwheat (7.7)
corn spurry (5.6) (2-3 leaf)	Indian mustard (8.8)	shepherd's-purse	wild mustard (8.6)
cow cockle (2-3 leaf)	kochia (7.9)	stinkweed (8.4)	wild radish
false ragweeds	lady's-thumb (8.1)	tartary buckwheat (7.6)	wormseed mustard
flixweed	lamb's-quarters (8.5)		

* Apply before bolting when this weed is at the 2 - 4 leaf stage.

- 5. Weeds Suppressed:** Canada thistle (7.3) as top growth control, cleavers (7.2), perennial sow thistle (7.6) top growth control only.

6. When Used:

Crop stage: Barley, oats, spring wheat (including durum): 2 - 5 leaf stage. Winter wheat: Apply in spring when wheat is 15 - 25 cm tall or before shot blade stage.

Weed stage: Weeds controlled in the 2 to 4 leaf stage, unless otherwise noted. For cow-cockle and hemp-nettle, apply at the 2 - 3 leaf stage, and for corn spurry, apply at the 2 - 3 whorl stage.

7. How to Apply:

With: Aircraft or ground equipment.

Rate: 500 mL/ac.

Water volume: Air: 8 L/ac minimum. Ground: 40 L/ac.

Pressure: Air: not above 200 kPa. Ground: 275 kPa.

Nozzles: Flat fan recommended.

- 8. Application Tips:** Best under good growing conditions and air temperature 10 - 25°C. Avoid application when crop is under stress from disease or adverse environmental conditions. Do not spray if rain is expected within 4 hours of application. Avoid application if frost or severe drop in night temperature is forecast. To prevent drift to sensitive crops, do not spray if temperatures are expected to exceed 30°C, when humidity is high or fog is present. Crop damage can occur if the chemical is applied at any time other than the recommended crop stage. Shortening of straw may occur without loss in yield.

- 9. How it Works:** DyVel is a systemic herbicide absorbed through the roots and leaves and translocated readily.

10. Expected Results:

Weeds: Twisting, bending of main stem and leaf petioles, cupping of leaves or increase in root size occur within 10 - 14 days. Poor results may be expected if it rains within 4 hours of application, or when older weeds are sprayed or if less than recommended water volume is used.

- 11. Effects of Rainfall:** Rainfall 4 hours after application will not reduce effectiveness.

- 12. Movement in Soil:** At recommended rates, very little movement occurs.

13. Cropping Restrictions:

Preharvest interval: 60 days.

Succeeding crops: No restrictions.

Grazing restrictions: Allow 30 days after application of DyVel, or DyVel + Horizon, and grazing or cutting of cereal crop for hay.

- 14. Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = dicamba 2,629 mg/kg, MCPA = 700 mg/kg. Non-toxic to birds, fish and bees. May cause burns and can be absorbed through the skin.

- 15. Precautions, First Aid:** Check label for first aid information.

- 16. Storage:** Protect from freezing, but if frozen, no activity is lost if completely resuspended.

- 17. Resistance Management:** See page 41 for information on resistance management.

DyVel DSp

(dicamba + mecoprop-p + 2,4-D amine)

Manufacturer: BASF Canada

Group 4



Caution Poison

Herbicides

- Formulations:** Liquid; 295 g/L 2,4-D Amine + 80 g/L mecoprop-p + 110 g/L dicamba (PCP# 27856); 2 x 10 L jugs, 110 L shuttles.
- Registered Mixes:** Aatrex Liquid, Aatrex 90W or Aatrex Nine-0 (corn). Everest in spring wheat only (17.4 g/ac + Agral 90 or Ag-Surf at 0.25 L per 100 L of spray solution). Puma Super (green foxtail: 200 mL/ac). Puma¹²⁰ Super (green foxtail: 156 mL/ac).

3. Crops:

barley (8.5)	native rangeland	roadsides	summerfallow	sweet corn (8.3)
durum wheat (7.9)	permanent pasture	spring wheat (7.9)	stubble fields	winter wheat (7.9)
field corn (8.3)				

Underseeding: Do not apply to crops underseeded to legumes.

4. Weeds Controlled:

In crops

annual smartweeds (7.7)	flixweed (7.8)	prostrate pigweed	volunteer buckwheat
annual sow thistle	hedge bindweed	redroot pigweed (7.7)	volunteer canola
ball mustard	Jerusalem artichoke (in corn)	Russian thistle (7.3)	(2 - 4 leaf stage)
cocklebur	kochia	shepherd's-purse (8.6)**	wild buckwheat (8.1)
common ragweed	knotweed	stinkweed (8.6)	wild mustard (8.6)
corn spurry (7.3)	lady's-thumb	tall mustard	wormseed mustard
cow cockle (7.6)**	lamb's-quarters (8.5)	tartary buckwheat**	yellow mustard
field bindweed*			

Pastures and along roadsides

alders	bull thistle	poison-ivy	sheep-laurel
chicory	goat's-beard	ragwort	white cockle

* If applied to field bindweed when it is actively flowering.

** Use high registered rate for each crop to control.

- Weeds Suppressed:** Cleavers (7.0) (should be treated in the 1 - 2 whorl stage), round-leaved mallow.
- When Used:**

Crop stage: Barley: 2 - 3 true leaf stage.*

Corn: Overall, spray prior to 15 cm height of corn: use drop nozzles after 30 cm height.

Wheat (durum, spring): 3 - 5 true leaf stage.*

Wheat (winter): In spring, before crop is 30 cm high.

Weed stage: For best results, apply when weeds are actively growing and are in the 2 - 3 leaf stage unless otherwise noted.

Summerfallow: When Canada thistle is in the early bud stage. Do not cultivate for a minimum of 4 weeks after treatment.

Pastures and roadsides: Spring, when weeds are in 2 - 5 leaf stage and actively growing.

* All leaf stages refer to true leaf stage, and tillers should not be counted as true leaves.

7. How to Apply:

With: Ground equipment.

Safety information, see page 25

DyVel DSP (cont'd)**Rate:****Barley:** 340 mL/ac.**Wheat:** 340 - 445 mL/ac.**Corn (field, sweet):** 340 - 445 mL/ac.**Pastures and roadsides:** 1.3 L/ac.**Crop free land (stubble, summerfallow):** 445 - 710 mL/ac.**Tank mix:** 345 - 445 mL/ac + (Aatrex Liquid: 910 mL/ac, Aatrex 90W: 506 g/ac or Aatrex Nine-O: 506 g/ac).**Water volume:** 40 L/ac for cereals; 81 - 142 L/ac for corn.**Pressure:** 200 - 275 kPa.**Nozzles:** Flat fan recommended.

8. **Application Tips:** Ensure that proper rate, water volume and timing are used; otherwise, crop injury may occur. Risk of crop injury increases as water volume drops below 36 L/ac. Do not apply when temperatures exceed 27°C and relative humidity is very high. Use the 445 mL/ac rate for hard to kill weeds, suppression of cleavers and round-leaved mallow, for top-growth control of Canada thistle, when weeds are at an advanced growth stage, when weed densities are high, or under adverse weather conditions. Use the 340 mL/ac rate for easy to kill weeds, when weed densities are low and growing conditions are optimum. Apply to weeds that are actively growing and are in the 2 - 3 leaf stage for best results.
9. **How it Works:** Accumulates in the growing points resulting in abnormal growth which disrupts the transport system in plants.
10. **Expected Results:**

Weeds: Visible effects occur 7 - 14 days after spraying. Leaves curl, leaf petioles twist, leaf edges turn brown, the whole plant ceases growth, eventually turns brown and dies.

Crop: Improper applications can result in abnormal bending at the internodes of grain stalks, difficulty in head emergence from sheath, curled awns, malformed kernels and sterile florets. Poor results may be expected with overmature weeds, inadequate coverage or rainfall less than 4 hours after application.
11. **Effects of Rainfall:** Do not spray if rain is expected within 4 hours.
12. **Movement in Soil:**

2,4-D/mecoprop-p: Readily mobile in the soil.

Dicamba: Relatively mobile; mobility affected by capillary movement and/or surface evaporation. Concentration and location in the soil profile will be determined by total seasonal precipitation, its frequency and original herbicide dosage.
13. **Cropping Restrictions:**

Succeeding crops: No restrictions.

Grazing restrictions: Do not permit lactating dairy animals to graze fields within 7 days. Do not harvest forage or cut hay within 30 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter.

Drift: Tomatoes, sugar beets, sunflowers, beans, turnips, cauliflower, cabbage, ornamentals and fruit crops are very sensitive to drift.
14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) formulated product = 1,000 mg/kg. Non-toxic to fish and bees. Intake may cause convulsions.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Heated storage preferred. If frozen, shake thoroughly before use.
17. **Resistance Management:** See page 41 for information on resistance management.

Eclipse III (clopyralid + glyphosate)

Group 4,9

Manufacturer: Dow AgroSciences Canada Inc.



Caution Poison



Caution Irritant

Herbicides

1. Formulations:

Eclipse III A: 360 g/L clopyralid (PCP# 29032); 4.45 L jug. **Eclipse III B:** 480 g/L glyphosate (acid equivalent present as dimethylamine salt) (PCP# 29033); 2 x 7.5 L jugs.

2. Registered Mixes: None.

3. Crops: Glyphosate tolerant canola varieties only.

4. Weeds Controlled:

Canada thistle (season-long)	hemp-nettle	redroot pigweed	volunteer canola
chickweed	kochia	Russian thistle	(non- glyphosate tolerant)
cleavers	lady's-thumb	shepherd's-purse	volunteer wheat
corn spurry	lamb's-quarters	smartweed	wild buckwheat
cow cockle	night-flowering catchfly	stinkweed	wild mustard
green foxtail	quackgrass (season-long)	volunteer barley	wild oats
			wild tomato

5. Weeds Suppressed: Dandelion, perennial sow thistle.

6. When Used:

Crop stage: Glyphosate tolerant varieties only. Apply at the 2 - 6 leaf stage of the crop.

Note: Some short term visual yellowing may occur when a late application (4 - 6 leaf stage) of Eclipse herbicide is applied to the crop, on canola varieties.

7. How to Apply:

With: Ground equipment only. Do not apply by air. **Note:** Do not use galvanized steel or unlined steel tanks as a combustible gas may be formed.

Rate: Eclipse A: 113 mL/ac. Eclipse B: 380 mL/ac.

Water volume: 40 L/ac.

Pressure: Use low pressures 200 to 275 kPa.

Nozzles: Use nozzles that deliver higher volumes and coarser droplets.

8. Application Tips: Apply when the canola is in the 2 - 6 leaf stage. Ensure that the crop has not advanced beyond the recommended leaf stage for application. Treat crops during warm weather when weeds are actively growing. Best results are obtained when Canada thistle is actively growing and soil moisture is adequate for rapid growth. Do not treat weeds under poor growing conditions such as cool, dry conditions, drought stress, disease or insect damage as reduced weed control may result. Reduced results may occur when treating weeds heavily covered with dust. Reduced results may occur if water-containing soil is used, such as water from ponds and unlined ditches.

9. How it Works: Eclipse tank mix is readily absorbed by foliage and roots. It translocates both upwards and downwards in plants. Eclipse A is a systemic, hormone-type herbicide. It is absorbed by leaf, stem surfaces and roots. It is readily translocated upwards and downward. Eclipse B is a non-selective, systemic herbicide that moves from the foliage into the roots and kills the entire plant. Maximum efficacy results from foliar application to young, actively growing plants.

Eclipse III (cont'd)

- 10. Expected Results:** Under good growing conditions, wilting and yellowing of annuals occurs within 2 - 4 days. Herbicide symptoms on affected annual and perennial weeds may also include swollen growing points and roots, cupping of leaves, twisted and distorted stems and leaves. Cool or cloudy weather may slow activity. Affected weeds turn yellow before turning brown as they die. Death of weeds may not occur until 14 - 21 days after application. Browning of above ground growth and deterioration of roots occurs.
- 11. Effects of Rainfall:** Heavy rainfall immediately after application may wash the chemical off the foliage, and a repeat treatment may be required. Do not apply if rainfall is forecast for the time of application.
- 12. Movement in Soil:** Eclipse A herbicide is somewhat soluble in water but is generally not mobile in soil under typical prairie conditions. The amount of Eclipse B herbicide leaching is very low.

13. Cropping Restrictions:

Succeeding crops: Fields treated with Eclipse herbicide tank mix can be seeded the following year to barley, canola, flax, forage grasses, mustard, oats, peas, rye, wheat or summerfallowed.

Very dry soil conditions following application can result in a risk of injury to field peas grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive in the year of application (less than 140 mm rain between June 1 and August 31 or less than 175 mm rain in the whole year) delay seeding field peas an additional 12 months (22 months following application). Contact your local Dow AgroSciences representative or retailer for more information before seeding field peas following drought conditions in the previous year.

Do not seed crops other than those listed above for at least one year after treatment.

Manure and straw: Residues of Eclipse tank mix occurring in the straw may be harmful to susceptible plants. Do not use straw or crop residue from treated crops for composting or mulching susceptible broadleaf crops. If straw or crop residue is used for animal bedding or feed, return the manure to fields to be planted to clopyralid tolerant crops. Do not grow susceptible broadleaf crops such as beans, lentil, potato and sunflower on land mulched with straw containing clopyralid residue within the last 12 months.

Drift management: Do not allow spray mist to drift since even small amounts of spray can cause severe damage to non-target crops and plants. Do not apply when winds are gusty or in excess of 8 km/h.

Grazing restrictions: Allow 3 to 5 days before grazing treated areas.

14. Toxicity:

Eclipse A: Very low acute mammalian toxicity. Acute oral LD_{50} (rats) = >2,000 mg/kg.

Acute oral LD_{50} (bees) = >100 µg/bee. Extremely low toxicity to fish.

Eclipse B: Very low acute mammalian toxicity. Acute oral LD_{50} (rats) = 4,320 mg/kg. Eye irritant. Non-toxic to bees, birds and fish.

15. Precautions, First Aid: Check label for first aid information.**16. Storage:** Store away from food, feedstuff, fertilizer, seeds, insecticides, fungicides or other pesticides or herbicides intended to be used on crops sensitive to clopyralid. Store in heated storage. If products are frozen, bring to room temperature and agitate before use. Soak up small amounts of spill with absorbent clays.**17. Resistance Management:** See page 41 for information on resistance management.

Edge (ethalfluralin)

Group 3

Manufacturer: Dow AgroSciences Canada Inc.

1. **Formulations:** Granular; 5% (PCP# 20980); 25 kg bag and 544 kg returnable bag.
2. **Registered Mixes:** None.
3. **Crops:** Alfalfa (establishment), canola (9.0) (including triazine tolerant), caraway, coriander, dill, dry common beans, fababeans, kidney beans, peas (9.0), safflower (9.0), soybeans, sunflowers (8.7), white beans, yellow mustard (8.6). Lentils – fall application only.

4. Weeds Controlled:

barnyard grass (8.2)	cow cockle	green foxtail (8.5)	purslane
blueweed	crab grass	kochia (7.0)	redroot pigweed (8.2)
chickweed (7.3)	fall panicum	lamb's-quarters (8.6)	wild buckwheat (8.3)
corn spurry	giant foxtail	prostrate pigweed	yellow foxtail

5. **Weeds Suppressed:** American nightshade, black nightshade, cleavers (6.4), hemp-nettle, lady's-thumb (7.7), Russian thistle, volunteer barley (6.3), volunteer wheat, wild oats.

6. When Used:

Fall: Between September 1 and soil freeze-up.

Spring: Cultivate to destroy weeds; apply prior to seeding crop.

7. How to Apply:

With: Ground equipment only.

Rate:

Organic matter	Spring	Spring	Fall	Fall
	Sand to sandy loam 5% G**	Loams to clays 5% G**	Sand to sandy loam 5% G**	Loams to clays 5% G**
2 - 4%	6.9 kg/ac	6.9 kg/ac	8.9 kg/ac	8.9 kg/ac
4 - 6%	6.9 kg/ac	8.9 kg/ac	8.9 kg/ac	11.3 kg/ac
6 - 15%	8.9 kg/ac	8.9 - 11.3 kg/ac*	11.3 kg/ac	11.3 kg/ac

* For improved results, use higher rates for fields with high populations of weeds.

** G – Granular.

Incorporation: First incorporation must be done within 24 hours of application. Second incorporation should be done at right angles to the first.

Spring application: Apply Edge 5G when the soil is in good working condition. Ensure that the early season flush of weeds are killed by either first or second incorporation. Delay second incorporation a minimum of 3 days. This allows time for greater release of Edge from the granule into the soil and assures a more uniform distribution. Seed into a weed-free seedbed using accepted cultural practices.

Fall application: It is recommended that both incorporations be completed in the fall. For optimum weed control, prework the field early in the spring to promote germination of weeds and to allow green growth of resistant weeds to develop. Use a 5 - 8 cm deep cultivation with Vibrashank type cultivator or disc prior to seeding to destroy existing green growth. Seed into a weed-free seedbed using accepted cultural practices.

Implements: A tandem disc, disker, or field (vibrashank) cultivator is recommended. Set to work 8 - 10 cm deep. Discimplements at 7 - 10 km/hr; cultivators at 10 - 13 km/hr. Do not use a field cultivator to incorporate when soil is crusted, lumpy or too wet for good mixing. A tandem disc gives best mixing action on stubble.

Edge (cont'd)

- 8. Application Tips:** To avoid concentrating wild oat and volunteer cereal seeds below the treated layer, do not plow the land prior to Edge application. Do not apply to fields spread with manure during the past 12 months. Do not apply to soils subject to prolonged periods of flooding or soils in poor working condition. If swath from previous crop has been removed by burning, cultivate once to remove the charcoal layer prior to Edge application. Edge 5G can be used where trash is heavier or on standing weeds provided they do not interfere with distribution of the granules and do not limit incorporation. Do not apply on soils with less than 2% organic matter. Application on eroded knolls or Grey Wooded Soils with highly variable texture and organic matter may result in a reduced crop stand, delayed development or reduced yield in either treated crop or rotational crop.
- 9. How it Works:** A pre-emergence herbicide that kills seedlings as they germinate. Inhibits cell division in the actively growing points of the root and shoot. Does not control established weeds.
- 10. Expected Results:**
Weeds: Most die before emerging. Weeds will exhibit swelling of the coleoptile region, stubby, thick primary root development and lack of secondary roots. Plants die from lack of ability to obtain moisture.
- 11. Effects of Rainfall:** No effect once incorporated into the soil.
- 12. Movement in Soil:** None.
- 13. Cropping Restrictions:**
Succeeding crops: Will not harm rotational crops if used as directed. As a precaution, very sensitive crops such as oats, sugar beets or small-seeded grasses such as timothy, canary seed and creeping red fescue should not be grown following an Edge treated crop. Over application caused by overlapping, improper calibration or non-uniform application may reduce stands of crops grown in rotation. Drought conditions in the year of treatment may result in higher than normal levels of Edge in the soil at the end of the growing season. Therefore, to reduce the possibility of injury to rotational crops, seed shallow into a warm, moist seedbed using recommended agronomic practices which will promote rapid germination and emergence of the rotational crop. Avoid direct seeding (zero till) and seeding into loose seedbeds. Refer to industry or government extension documents which outline seeding practices for each crop. Use good quality certified seed. As an additional safety precaution, seeding rate may be increased slightly (10%). As a precaution, do not seed wheat as a rotational crop on land that has received ethalfluralin or trifluralin at oilseed/special crop/barley rate for two consecutive years.
Grazing Crops: Do not graze the treated crop or cut for hay; data is insufficient to support such use.
- 14. Toxicity:** Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) = technical >5,000 mg/kg. Direct contamination of any body of water may kill fish.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Store in areas not exposed to high temperatures or prolonged direct sunlight. Do not let Edge 5G remain in standing applicator under these conditions.
- 17. Resistance Management:** See page 41 for information on resistance management.

Embutox/Caliber/Cobutox

(2,4-DB)

Group 4

Manufacturer: Nufarm Agriculture/United Agri Products Canada Inc./Interprovincial Co-operatives



Warning Poison

- 1. Formulations:** Emulsifiable concentrate; **Caliber:** 625 g/L (PCP# 27910); 2 x 10 L jugs.
Cobutox: 625 g/L (PCP# 27911); 2 x 10 L jugs. **Embutox:** 625 g/L (PCP# 27912); 2 x 10 L jug.

Embutox/Caliber/Cobutox (cont'd)

- 2. Registered Mixes:** MCPA Amine: All formulations may be recommended in tank mix with other products. Consult the label of the tank mix partner, and follow the most stringent set of precautions, restrictions and directions for use.

3. Crops:

alfalfa (seedling) (8.0)	clover (seedling) (not sweet clover)	field corn	pastures (9.0)
barley (9.0)	durum wheat	forage grasses (seedling)	spring wheat (8.8)
bird's-foot trefoil (seedling)		oats (8.2)	

4. Weeds Controlled:**0.7 L/ac**

ball mustard (5.8)	ragweed	shepherd's-purse (6.5)	wild mustard (5.8)*
lamb's-quarters (8.5)	redroot pigweed (7.5)	stinkweed	wormseed mustard (5.8)

* Wild mustard beyond 4-leaf stage may not be controlled. A tank mix of 0.5 L/ac of 2,4-DB (625 g/L) and 35 g active ingredient per ha (28 mL/ac of MCPA Amine 500) may give better control.

0.9 - 1.1 L/ac

bull thistle	field bindweed	plantain	wild radish
chicory	narrow-leaved hawk's-beard	wild buckwheat (5.7)	yellow rocket
curled dock (8.0)	oak-leaved goosefoot		

5. Weeds Suppressed:

Canada thistle (5.4)	green smartweed (5.4)	lady's-thumb
dandelion	horsetail	perennial sow thistle (5.4)

6. When Used:

Crop stage: Barley, oats and spring wheat: 5th leaf to early flag leaf.

Field corn: After crop is 40 cm high, but before the beginning of tasselling.

Legumes: Seedling alfalfa, bird's-foot trefoil: 1 - 4 trifoliate leaf. Seedling white, alsike clover: after the first trifoliate leaf.

Pastures: After cutting or grazing and before regrowth is 7.5 cm tall.

Weed stage: 1 - 3 leaf stage. **Narrow-leaved hawk's-beard:** Rosette stage in late fall after alfalfa has become dormant, but weeds are still growing.

7. How to Apply:

With: Ground equipment.

Rate:

Crop	Caliber 625, Cobutox 625, Embutox 625 L/ac
Alfalfa, bird's-foot trefoil, grasses (seedling; direct or underseeded)	0.7 - 0.9
Barley, oats, wheat	0.7 - 0.9
Clovers (seedling; direct or underseeded)	0.7 - 0.9
Dandelion, horsetail, smartweeds*	1.1
Field corn	0.7 - 1.1
Pasture (containing legumes)	0.7 - 1.1
Perennial weeds	0.9 - 1.1

* Seedlings only stunted.

Use 500 mL/ac Embutox 625 tank mixed with 47 mL/ac MCPA Na-salt or 36 mL/ac MCPA K-salt for improved wild mustard control beyond the 4 leaf stage. Refer to other formulation labels for tank mixes for wild mustard control.

Water volume: 60 - 80 L/ac.

Pressure: 275 kPa.

Embutox/Caliber/Cobutox (cont'd)

Nozzles: Flat fan recommended.

- 8. Application Tips:** Damage to forage legumes (especially to established alfalfa) may occur and increase in severity the longer treatment is delayed beyond stage recommended. Do not spray in drought conditions. Oats are sensitive if treated before the 5 leaf stage. For better wild mustard control, tank mix with MCPA Amine for use on seedling alfalfa and bird's-foot trefoil – some crop stunting may occur. Use low rate when tank mixing with MCPA (see product label).
- 9. How it Works:** Susceptible plants convert 2,4-DB to 2,4-D. Certain legumes do not convert it. 2,4-DB is translocated to actively growing parts.
- 10. Expected Results:** Weeds should die within 2 - 3 weeks of treatment. Smartweeds seedlings only stunted.
- 11. Effects of Rainfall:** Rainfall before the foliage has dried from the spraying may decrease activity.
- 12. Movement in Soil:** Leaching does not pose a problem.
- 13. Cropping Restrictions:**
Grazing restrictions: Do not graze or harvest for livestock feed until 30 days after treatment.
- 14. Toxicity:** Low acute mammalian toxicity. Toxic to fish. Non-toxic to birds and bees.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Heated storage is not required. If frozen, warm to 20 - 22°C and agitate thoroughly.
- 17. Resistance Management:** See page 41 for information on resistance management.

Eptam (EPTC)

Manufacturer: Gowan Company

Group 8



Caution Poison

- 1. Formulations:** Emulsifiable concentrate; 800 g/L (PCP# 11284); 2 x 10 L.
- 2. Registered Mixes:** Treflan and Rival [beans (dry common white and red kidney) only], Eptam 8-E + Sencor (Irish potatoes), liquid or granular fertilizers (except nitrate based), Rival, Treflan.
Mixing restrictions: Check fertilizer compatibility before tank mixing.
- 3. Crops:** Alfalfa (7.7), bird's-foot trefoil, dry beans (7.8), flax (7.5), Irish potatoes (8.8), snap beans (8.7), sugar beets (8.3), sunflowers (7.8), turnips (rutabagas) (8.0).

Seed production only: Cicer milk vetch, sweet clover. **Underseeding:** Not recommended.

4. Weeds Controlled:

annual bluegrass (7.2)	hairy nightshade (6.3)	purslane	volunteer barley (7.0)
barnyard grass (8.6)*	henbit	quackgrass	volunteer oats
common chickweed	Italian ryegrass (8.4)	redroot pigweed (6.3)*	volunteer wheat (7.9)
corn spurry (9.0)	lamb's-quarters (6.4)*	tumble pigweed*	wild oats (8.1)
green foxtail (7.7)*	prostrate pigweed*		

* In dry beans, improved control can be obtained by tank mixing with Treflan or Rival.

5. Weeds Suppressed: None.

- 6. When Used: Crop stage:** Alfalfa, bird's-foot trefoil (seedlings), cicer milk vetch, sweet clover – Pre-planting: Do not use if seeding a grain or grass nurse crop.

Snap beans or dry beans (including red kidney) – Pre-planting: Do not use on cow peas or Adzuki, soy, lima or other flat-podded beans except Romano.

Flax, sunflower – Spring – Pre-planting: Do not apply in spring to soils with less than 3% organic matter.

Fall – Before freeze-up: Cultivate lightly to destroy any overwintering rosettes in spring before seeding.

Safety information, see page 25

Potatoes: Incorporate in the fall or spring, after pre-emergence cultivation or before the last cultivation. Eptam 8-E can also be metered into sprinkler irrigation equipment (read label for instructions).

Turnips: Apply and incorporate 6 - 10 days before planting.

Sugar Beets: In sprinkler irrigation water.

Note: Fall application should not be used in areas where soil drifting is a hazard.

7. How to Apply:

With: Ground equipment or irrigation water.

Rate:

Crop	Eptam 8-E L/ac	Crop	Eptam 8-E L/ac
Alfalfa, bird's-foot trefoil,	1.7	Potatoes (pre-plant, pre-emergent)	1.7 - 3.4
cicer milk vetch, sweet clover		(post-emergent)	1.7 - 2.2
Dry beans, snap beans	1.7 - 2.2	(sprinkler)	1.7 - 2.2
(see exceptions in <i>When Used</i>)		(fall)	2.2 - 3.4
Flax (spring; sandy soil)	1.4	Sugar beets (sprinklers)	1.1 - 1.7
(spring; clay soil)	1.7	Sunflowers (spring)	1.7
(fall; sandy soil)	1.7	(fall)	1.7 - 2.2
(fall; clay soil)	2.2	Turnips (sandy soil)	1.3
(Do not use on Flax south of Highway 1 in Alberta)		(clay soil)	1.7

Dry common beans, red kidney beans, white beans, Eptam 8-E + Treflan 545EC or Rival 500EC, 1.2 L/ac + 445 mL/ac or 486 mL/ac.

Water volume: 45 L/ac minimum.

Pressure: 275 kPa.

Nozzles: Flat fan recommended.

Incorporation: Incorporate immediately. Second incorporation must be at right angles to the first. Power-driven cultivation equipment, set to cut 5 - 7.5 cm deep. Tandem, one way discs, set to cut 10 - 15 cm and operate at 6.5 - 9.5 km/h followed by harrows. Field cultivators, for lighter soils in good tilth. Use 3 - 4 rows of sweeps spaced no wider than 18 cm. Cut 10 - 15 cm deep at 9.5 km/h. Pull a levelling device (such as harrows) behind incorporating equipment.

8. Application Tips: For use on mineral soils only. When applying Eptam 8-E with granular fertilizer, a minimum of 81 kg/ac and a maximum of 324 kg/ac of fertilizer is required. See product label for further instructions.

Flax, special instructions: Seed shallow, less than 3 cm, into a firm seedbed. Deep seeding reduces stands.

9. How it Works: Taken up by the roots and shoots of a germinating weed where it disrupts and stops further shoot growth.

10. Expected Results:

Weeds: Absorbed by the weed shoot, therefore, most affected weeds will not emerge. Numerous chlorotic and bleached shoots may be visible by removing the top few inches of treated soil. Provides effective weed control for approximately 6 - 8 weeks.

Crops: If crop seedlings are weak, some injury may occur.

11. Effects of Rainfall: Very soluble in water so excessive moisture may cause leaching (usually not a problem in Alberta).

12. Movement in Soil: Eptam will move readily in the soil.

13. Cropping Restrictions:

Grazing restrictions: Do not graze or harvest for livestock feed in year of treatment.

Harvest restriction: Pre-harvest interval (days) after treatment - potatoes (45).

Eptam (cont'd)

Succeeding crops: No restrictions.

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = 1,600 mg/kg. Very toxic to fish. Non-toxic to birds.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Heated storage not required. Store away from seed and fertilizer.
17. **Resistance Management:** See page 41 for information on resistance management.

Equinox (tepraloxydim)

Group 1

Manufacturer: BASF Canada



Caution Poison



Warning Irritant

1. **Formulations:** Emulsifiable concentrate; 200 g/L tepraloxydim (PCP# 27603); 3.24 L jug. Merge adjuvant (PCP# 24702); 8.1 L jug.
2. **Registered Mixes:** **Flax** (including low linolenic varieties): Buctril M (0.41 L/ac). **Clearfield lentils, Clearfield canola, field peas:** Odyssey WDG (17 gm/ac). **LL Canola: Liberty 150 SN (1.08 – 1.35 L/ac).**
3. **Crops:** Canola, Clearfield canola, Liberty Link Canola, Clearfield lentils, lentils, flax (including low linolenic varieties), field peas.
4. **Weeds Controlled:** Green foxtail, quackgrass, volunteer barley, volunteer oats, volunteer wheat (including Clearfield wheat), wild oats.
5. **Weeds Suppressed:** None.
6. **When Used:**

Canola, Clearfield canola, Clearfield Xceed: emergence to 6 leaf.

Liberty Link Canola: emergence to rosette stage.

Clearfield lentils: 1 - 6 node stage.

Lentil: Emergence to 9 leaf.

Flax: Emergence to 35 cm.

Field pea: Emergence to 9 leaf.

Note: Equinox **must** be used with Merge Adjuvant. Merge must be used with Equinox when applied alone or in tank mix with other herbicides. Use 0.5 L of Merge per 100 L of final spray volume of spray.
7. **How to Apply:**

With: Ground equipment only.

Rate: 54 - 101 mL/ac. Canola, Clearfield canola: 54 - 67 mL/ac, LL canola - 54 mL/ac.

Annual grass weeds: Volunteer barley, volunteer oats, volunteer wheat (including Clearfield varieties), wild oats, green foxtail: Grasses at 1 - 6 leaf stage including 2 tillers - 54 - 81* mL/ac (60 - 40* acres per case).

* **Use the 40 ac/case rates when weed densities exceed 45 weeds/square meter.** Use when weed densities are high and overlapping, when staging is late or when weeds are under stress and not growing as actively due to moisture or temperature stress.

Quackgrass control: Can spray from 3 - 6 leaf stage. However, for optimum control, apply at the 2 - 4 leaf stage prior to tillering (6 to 15 cm in height).

Water volume: 40.5 L water/ac.

Pressure: Use a minimum pressure of 35 psi (240 kPa). For dense weed pressures or if crop or weed growth is dense, use a pressure of 40 to 62 psi (275 to 425 kPa).

Nozzles: Stainless steel 80° or 110° flat fan nozzles tilted forward at an angle of 45° are recommended for optimum coverage. The use of flood jet or hollow cone nozzles is not recommended because of uneven and inadequate spray coverage.

- 8. Application Tips:** Optimum yield response occurs when weeds are controlled early. Equinox controls grasses present at time of application, and it does not control second flushes. Most effective control is achieved when grasses are actively growing. Weeds stressed by drought, flooding, hot or prolonged cool temperatures (<15°C) and poor fertility are more difficult to control. Use the higher of the recommended rates for grasses under stress. To avoid reduced control, do not apply to grasses stressed because of lack of moisture, flooding, hail, herbicide damage, mechanical injury and widely fluctuating temperatures. To maximize control, apply Equinox in warm weather as control may be reduced if temperatures are below 15°C.

Allow 4 days between the application of Equinox and any chemical not recommended as a tank mix.

- 9. How it Works:** Equinox EC herbicide is a systemic herbicide that rapidly enters the target weed through its foliage and translocates throughout the plant. Thorough coverage of the foliage is important for consistent grass control. Once plants are treated, growth is slowed to stopped, generally within 2 days.

10. Expected Results:

The young leaves turn yellow within 5 - 10 days, and some grass species develop a reddish coloration. Necrotic spots then form on the leaves, followed by death. An easy method of detecting whether the treatment has taken effect at an early stage is whether the youngest leaf can be easily pulled out of the leaf sheath. The time required for complete control is normally 7 - 21 days following treatment, depending on growing conditions and crop competition.

Control of quackgrass develops more slowly than control of annual grasses. Equinox EC herbicide is translocated through the quackgrass plant to the rhizomes and kills actively growing rhizome buds, as well as aboveground vegetation. Dormant rhizome buds will remain unaffected by the spray, and regrowth can occur from these buds. When Equinox EC herbicide is applied according to label directions, the regrowth of the quackgrass will not be significant until 6 - 8 weeks after treatment, depending on growing conditions, crop cultivation practices and crop competition.

- 11. Effects of Rainfall:** Equinox is extremely rainfast. Only one hour is required following application.

- 12. Movement in Soil:** None.

13. Cropping Restrictions:

Preharvest interval: Canola, Clearfield canola, Clearfield lentil, lentils, field peas and flax – 60 days.

Grazing interval: Field peas may be used for grazing following the 60 day preharvest interval. Do not graze other treated crops or cut for feed prior to crop maturity.

Recropping: Allow a minimum of 14 days between application and re-planting of cereals or grass crops. A general plant back interval of 40 days is recommended.

- 14. Toxicity:** Caution: Poison. Warning: Eye and skin irritant.

- 15. Precautions, First Aid:** Check label for first aid information.

- 16. Storage:** Store the product in original, tightly-closed container and do not allow water to be introduced into this container. Do not ship or store the product near food, feed, seed or fertilizers. Store the product in a cool, dry, locked, well-ventilated area without a floor drain.

Herbicides should be shipped or stored separately from other pesticides to avoid cross-contamination.

- 17. Resistance Management:** See page 41 for information on resistance management.

Escort (metsulfuron-methyl)

Group 2

Manufacturer: E.I. duPont Canada Co.

1. **Formulations:** Dry flowable; 60% (PCP# 23005); 250 g container.
2. **Registered Mixes:** 2,4-D Ester or Amine. **Surfactants:** Escort must be used with a recommended surfactant such as Ag-Surf, Agral 90, or Citowett Plus.
Mixing instructions: Add 1/2 - 3/4 required amount of water. While agitating, add Escort and ensure it is completely suspended. If mixing with 2,4-D, add 2,4-D after the Escort is in suspension. Complete filling, then add surfactant. Continuous agitation is required. Antifoaming agent may be needed.
3. **Crops:** Non-crop areas, pasture, rangeland, rough turf.
4. **Weeds Controlled:** Common tansy, kochia*, Russian thistle, scentless chamomile, sweet clover: 8 g/ac.
 Western snowberry plus above weeds: 10 g/ac.
 Dandelion, wild rose plus above weeds: 12 g/ac.
 * **Note:** Prairie-wide surveys of kochia fields have found approximately 90% of kochia populations that are Group 2 herbicide resistant. Without testing to confirm, assume the kochia in your field is resistant and will not be controlled by this product alone.
5. **Weeds Suppressed:** Canada thistle, sow thistle.
6. **When Used:**
 Brush: Mid-June to mid-August after weed species has leafed out but before fall colouration begins.
 Weeds: Annuals – For best results, apply to young (less than 10 cm). Biennial and perennial weeds up to the early bud stage. Weeds should be actively growing at the time of application.
7. **How to Apply:**
With: Ground equipment. Do not apply by air.
Rate: 8 - 12 g/ac depending on weed species.
Surfactant: 2 L/1,000 L spray solution.
Water volume: 40 - 90 L/ac.
Pressure: 275 kPa.
Nozzles: Flat Fan types. 50 mesh or larger screens. Only metal or nylon filters.
Sprayer cleanup: To avoid injury to susceptible crops, clean sprayer thoroughly immediately after spraying using cleanup method A on page 16.
8. **Application Tips:** Apply as a full coverage spray to foliage and stems using equipment that will assure uniform coverage. Use spray preparation within 48 hours or product degradation may occur. If spray preparation is left standing without agitation, thoroughly agitate before spraying. Avoid overspray or drift to important wildlife habitats such as shelterbelts, wetlands, sloughs, and dry slough borders, woodlots, vegetated ditchbanks and other cover on the edge of fields. Leave a 50 metre buffer zone between the last spray swath and the edge of any of these habitats.
9. **How it Works:** Absorbed by foliage. Inhibits cell elongation.
10. **Expected Results:** Escort rapidly stops growth of susceptible species; however, typical symptoms (discolouration) may not be noticeable for several weeks after application, depending on growing conditions and weed susceptibility. Warm, moist conditions following treatment promote the activity of Escort while cold, dry conditions may reduce or delay activity. Brush hardened off by cold weather or drought stress may not be controlled.
11. **Effects of Rainfall:** Rainfall within 2 hours of application may lessen the degree of weed control.

- 12. Movement in Soil:** Movement of Escort is restricted by fine-textured soils, soil organic matter and neutral to acidic conditions.
- 13. Cropping Restrictions:**
Grazing restrictions: The treated area may be grazed on the day of treatment.
- 14. Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = >5,000 mg/kg.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Store in a cool, dry place. Non-corrosive, non-flammable, non-volatile and does not freeze.
- 17. Resistance Management:** See page 41 for information on resistance management.

Estaprop Plus/Turboprop/ Turboprop 600/ IPCO Dichlorprop-D (2,4-D + dichlorprop)

Group 4

Manufacturer: Nufarm Agriculture/United Agri Products Canada Inc./Interprovincial Co-operatives



Warning Poison

- 1. Formulations:** Emulsifiable concentrate; 282 g/L 2,4-D Ester isomer specific + 300 g/L dichlorprop.
Estaprop Plus: (PCP# 27968); 10.6 L, 114 L, 450 L containers.
Turboprop, Turboprop 600: (PCP# 27967/16532); 10 L, 115 L, 400 L containers.
IPCO Dichlorprop-D: (PCP# 27966); 10 L container.
- 2. Registered Mixes:** Dichlorprop + 2,4-D, all formulations may be recommended in tank mix with other products. Consult label of the tank mix partner product, and follow precautions, restrictions and directions for use.
- 3. Crops:** Barley (8.1), spring wheat (8.2), winter wheat (8.9). **Underseeded Legumes not recommended.**
- 4. Weeds Controlled:**
- | | | | |
|--------------------------|--------------------------|---------------------------|-------------------------|
| annual sow thistle (7.6) | hare's-ear mustard | ragweeds | stork's-bill (7.3) |
| ball mustard | Indian mustard | redroot pigweed (7.9) | tartary buckwheat (8.2) |
| bluebur (9.0) | kochia (8.1) | round-leaved mallow (6.9) | tumble mustard |
| burdock | lady's-thumb | Russian pigweed | volunteer rapeseed |
| cocklebur | lamb's-quarters (8.4) | Russian thistle (8.1) | volunteer sunflower |
| dandelion* | night-flowering catchfly | shepherd's-purse (7.8) | wild buckwheat (6.8) |
| dog mustard | oak-leaved goosefoot | smartweeds (6.9) | wild mustard (8.6) |
| flixweed (7.6) | prickly lettuce** | stinkweed (8.4) | wormseed mustard |
- * IPCO Dichlorprop-D & Estaprop registered for dandelion control on fall and winter wheat.
 ** Only IPCO Dichlorprop-D and Estaprop registered for prickly lettuce control in winter wheat.
- 5. Weeds Suppressed:** Canada thistle (5.6), curled dock, perennial sow thistle, round-leaved mallow**, toadflax.
 ** Turboprop only.
- 6. When Used:**

Crop stage: Barley, wheat (not underseeded with legumes: 4 leaf stage to the early flag leaf (shot blade) stage. Do not apply before the 4 leaf stage or between flag leaf to full-headed stages. Do not use on oats.

Winter wheat: Should be treated in early spring only, between full tillering and early flag leaf stages.

Estaprop Plus/Turboprop/Turboprop 600/PCO Dichlorprop-D (cont'd)

Weed stage: Apply when weeds are young and actively growing. Early spraying of stork's-bill, round-leaved mallow and kochia gives good control.

Dandelion (IPCO Dichlorprop-D & Estaprop Plus only): For fall or winter wheat treat in the spring between full tillering and early flag leaf stages, and when weeds are young and actively growing. Apply when dandelions are no larger than the 20 cm rosette stage.

7. How to Apply:

With: Ground or air equipment.

Rate: 710 mL/ac.

Water volume: 20 - 80 L/ac. Air: 12 L/ac.

Pressure: 275 kPa. Air: 235 kPa.

Nozzles: Flat fan recommended.

8. Application Tips: Crops under stress from adverse environmental conditions such as excess moisture, drought, or disease may suffer a further setback when Dichlorprop + 2,4-D is applied; however, the crop injury that may occur is usually offset by weed control obtained.

9. How it Works: A systemic herbicide absorbed by leaf and stem.

10. Expected Results: Twisting and curling of weeds will commence 2 - 10 days after application. Growth ceases, eventually plants turn brown and die. Poor results may be expected if poor coverage or low relative humidity during and after spraying.

11. Effects of Rainfall: Rain within 3 or 4 hours of application may reduce control.

12. Movement in Soil: Leaching does not pose a problem.

13. Cropping Restrictions:

Grazing restrictions: Do not graze or harvest for livestock feed until 30 days after treatment.

14. Toxicity: Moderate acute mammalian toxicity. Acute oral LD₅₀ (rats) = 2,4-D, 300 - 1,000 mg/kg, dichlorprop = 800 mg/kg. Do not spray on foraging bees. Toxic to bees. May be absorbed through the skin and may cause burns.

15. Precautions, First Aid: Check label for first aid information.

16. Storage: May be stored at any temperature. Shake well after storing for 1 year or longer.

17. Resistance Management: See page 41 for information on resistance management.

Estaprop Plus/Turboprop/ Turboprop 600/ IPCO Dichlorprop-D/ Desormone (2,4-D + dichlorprop)

Industrial

Group 4

Manufacturer: Nufarm Agriculture/United Agri Products Canada Inc./Interprovincial Co-operatives



Warning Poison

- 1. Formulations:** Emulsifiable concentrate; Estaprop Plus (PCP# 27968)/Turboprop 600/Dichlorprop-D; 282 g/L 2,4-D Ester isomer specific + 300 g/L dichlorprop. **Estaprop Plus:** 10.6 L, 114 L, 450 L container.

Safety information, see page 25

Estaprop Plus/Turboprop/Turboprop 600/PCO Dichlorprop-D/Desormone (cont'd)

Turboprop 600: 10 L, 115 L, 400 L containers. **Dichlorprop-D:** 10 L.

Estaprop/Turboprop/Dichlorprop-D: all 300 g/L Dichlorprop + 282 g/L 2,4-D.

Desormone: 350 g/L Dichlorprop + 330 g/L 2,4-D.

- 2. Registered Mixes:** Vanquish, fuel oil (basal, frill, stump), TCA (spruce, balsam, pine).

Mixing instructions: Add 1/2 amount of carrier, start agitation, add herbicide, then add rest of carrier. In water, agitate to prevent separation. In oil, do not let water get into mixture.

- 3. Crops:** Industrial areas, non-crop areas, rights-of-way, roadsides.

Underseeding: Not applicable.

- 4. Weeds Controlled:** Rate needed for control varies by weed present, see specific labels for details.

Brush:

Group 1

buckbrush	poplar	sugar maple	wild plum	white cedar
hawthorn	Scotch pine	wild cherry	wild raspberry	

Group 2

alder	bur oak	hickory	red pine	tamarack
aspen	elderberry	honeysuckle	rose	tame raspberry
balsam fir	elm	Manitoba maple	Scotch pine	white oak
basswood	ground juniper	poison-ivy	silver maple	wild apple
birch	hazel	poplar	sumac	willow
blueberry	hardhack			

Weeds (also weeds listed for Estaprop Plus, Turboprop 600)

alfalfa	chicory	goat's-beard	mullein	tansy
bull thistle	cinquefoil	goldenrod	perennial sow thistle	teasel
burdock	curled dock	hawkweed	plantain	vetch
buttercup	dandelion	horsetail	sweet clover	wild carrot
Canada thistle	dogbane			yellow rocket

- 5. Weeds Suppressed:** Milkweed, toadflax. Rate needed for suppression varies by weed present, see specific labels for details.

6. When Used:

Brush control: Apply on foliage and stems just before or just after brush is in full leaf in late spring or early fall. Many species may require retreatment the following year.

Basal treatment (not ash or basswood): Any time of year.

Frill treatment: Standing trees more than 13 - 15 cm in diameter.

Stump treatment: Immediately after cutting.

Weeds: During May or in early fall. Some species may require a second treatment.

7. How to Apply:

With: Power equipment, knapsack sprayer, air.

Rate: Brush control (8.75 - 11.7 L/1,000 L water): Estaprop Plus/Dichlorprop-D, Turboprop.

Roadsides: 4 L/Ha Estaprop Plus/Turboprop/Dichlorprop-D.

Foliage: 8.2 L Estaprop Plus/Turboprop/Dichlorprop-D + 5.2 L Vanquish/1,000 L.

Basal: 2.3 - 3.2 L Estaprop Plus/Turboprop/Dichlorprop-D/100 L diesel or fuel oil.

Frill treatment: 3.25 L Estaprop Plus/Turboprop/Dichlorprop-D/100 L diesel or fuel oil.

Weeds: Estaprop Plus/Turboprop/Dichlorprop-D, 1.6 L/ac.

Water volume:

Ground: Brush Control 305 - 610 L/ac depending on brush density and height. Weeds 80 - 240 L/ac, spray to point of runoff.

Pressure: As recommended for equipment used.

Nozzles: Flat fan recommended.

Estaprop Plus/Turboprop/Turboprop 600/PCO Dichlorprop-D/Desormone (cont'd)

- 8. Application Tips:** Thoroughly wet down all foliage and stems to ground level. Do not spray during high winds or high temperatures.
- 9. How it Works:** A translocated, systemic herbicide absorbed by leaves.
- 10. Expected Results:** Leaves brown and wilt shortly after spraying – no leaves appear the following year.
- 11. Effects of Rainfall:** Rain within 3 or 4 hours after application may reduce control.
- 12. Movement in Soil:** Leaching does not pose a problem.
- 13. Cropping Restrictions:**
Grazing restrictions: No grazing restrictions specified.
Drift: Over susceptible crops causes injury.
- 14. Toxicity:** Moderate acute mammalian toxicity. Acute oral LD₅₀ (rats) = 2,4-D, 300 - 1,000 mg/kg; dichlorprop = 800 mg/kg. Do not apply when bees are foraging. Toxic to bees. May be absorbed through the skin and may cause burns.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** If frozen, warm to 5°C and mix well.
Note: Similar products are Desormone.

Everest (flucarbazone sodium)**Group 2**

Manufacturer: Arysta LifeScience Canada, Inc.

- 1. Formulations:** Water dispersible granule, 70% (PCP# 26447); 567 g/jug.
- 2. Registered Mixes:**

Approved Tank Mix Partners in Spring Wheat

(including hard red spring, Canada prairie spring, soft white spring and extra strong (utility) wheat)

Broadleaf herbicide tank mix partner	Broadleaf herbicide product rates	Everest rates – wild oat and green foxtail	Surfactants (0.25 L/100 L of spray solution)
2,4-D Amine	up to 0.45 L/ac (500 g/L formulation)	8.7, 11.5 and 17.4 g/ac	Surf 92, SuperSpreader, LI 700, Agral 90, Ag-Surf
2,4-D Ester	up to 0.45 L/ac (500 g/L formulation)	8.7, 11.5 and 17.4 g/ac	Surf 92, SuperSpreader, LI 700, Agral 90, Ag-Surf
Ally** + 2,4-D Amine	2 to 3 g/ac + 2,4-D Amine up to 0.45 L/ac (500 g/L formulation)	8.7, 11.5*** and 17.4*** g/ac	Agral 90, Ag-Surf
Ally** + 2,4-D Ester	2 to 3 g/ac + 2,4-D Ester up to 0.45 L/ac (500 g/L formulation)	8.7, 11.5*** and 17.4*** g/ac	Agral 90, Ag-Surf
Attain	0.24 L/ac Attain A + 0.4 L/ac Attain B	8.7, 11.5*** and 17.4*** g/ac	Agral 90, Ag-Surf
Buctril M	0.4 L/ac	8.7, 11.5 and 17.4 g/ac	Surf 92, SuperSpreader, LI 700, Agral 90, Ag-Surf

(continued)

Safety information, see page 25

(continued)

Approved Tank Mix Partners in Spring Wheat
 (including hard red spring, Canada prairie spring, soft white spring and extra strong (utility) wheat)

Broadleaf herbicide tank mix partner	Broadleaf herbicide product rates	Everest rates – wild oat and green foxtail	Surfactants (0.25 L/100 L of spray solution)
Curtail M	0.6 - 0.8 L/ac	8.7, 11.5*** and 17.4*** g/ac	Agral 90, Ag-Surf
DyVel	0.51 L/ac	8.7, 17.4 g/ac	Agral 90, Ag-Surf
DyVel DSp*	0.35 L/ac	8.7, 17.4 g/ac	Agral 90, Ag-Surf
Estaprop, Dichlorprop-D	0.7 L/ac	8.7, 11.5 and 17.4 g/ac	Surf 92, SuperSpreader, LI 700, Agral 90, Ag-Surf
Express Pack	3.7 g/ac Express + 0.25 L/ac 2,4-D	8.7, 11.5 and 17.4 g/ac	Agral 90, Ag-Surf
Frontline 2,4-D	40 mL/ac Frontline 2,4-D A + 0.4 L/ac Frontline 2,4-D B	8.7, 11.5 and 17.4 g/ac	Agral 90, Ag-Surf
Frontline	40 mL/ac Frontline A + 0.34 L/ac Frontline B	8.7, 11.5 and 17.4 g/ac	Agral 90, Ag-Surf
MCPA Amine	up to 0.45 L/ac (500 g/L formulation)	8.7, 11.5 and 17.4 g/ac	Agral 90, Ag-Surf
MCPA Ester	up to 0.45 L/ac (500 g/L formulation)	8.7, 11.5 and 17.4 g/ac	Agral 90, Ag-Surf
Pardner*	0.4 L/ac	8.7, 17.4 g/ac	Agral 90, Ag-Surf
Prestige	0.32 L/ac Prestige A + 0.8 L/ac Prestige B	8.7, 11.5*** and 17.4*** g/ac	Agral 90, Ag-Surf
Refine Extra** + 2,4-D Amine	8 g/ac Refine Extra + up to 0.45 L/ac 2,4-D Amine	8.7, 11.5 and 17.4 g/ac	Surf 92, SuperSpreader, LI 700, Agral 90, Ag-Surf
Refine Extra** + 2,4-D Ester	8 g/ac Refine Extra + up to 0.45 L/ac 2,4-D Ester	8.7, 11.5 and 17.4 g/ac	Surf 92, SuperSpreader, LI 700, Agral 90, Ag-Surf
Target*	0.4 - 0.6 L/ac	8.7, 17.4*** g/ac	Agral 90, Ag-Surf
Spectrum	40 mL/ac Spectrum A + 0.6 L/ac Spectrum B	8.7, 11.5 and 17.4 g/ac	Agral 90, Ag-Surf
Thumper	0.4 L/ac	8.7, 11.5 and 17.4 g/ac	Surf 92, SuperSpreader, LI 700, Agral 90, Ag-Surf
Unity	0.2 L/ac Unity EC + 4.3 g/ac Unity 75 WG	8.7 and 17.5 g/ac	Agral 90, Ag-Surf

* Reduction in wild oat control may be observed with this tank mix partner.

** Addition of a second surfactant is not required for Everest Herbicide tank mixes with the herbicides Ally, Refine Extra and Unity herbicide tank mix. Use only one of the recommended surfactants at an application rate of 0.25 L total spray solution.

*** Apply specified dosage in at least 45 L/ac of water.

Everest (cont'd)

Tank mixes containing 2,4-D provide improved crop safety.

Approved Tank Mix Partners in Durum Wheat			
Broadleaf herbicide tank mix partner	Broadleaf herbicide product rates	Everest rates – wild oat and green foxtail	Surfactants (0.25 L/100 L of spray solution)
2,4-D Amine (500 g/L formulation)	up to 0.34 L/ac	8.7, 11.5 and 17.4 g/ac	Agral 90, Ag-Surf
2,4-D Ester (500 g/L formulation)	Up to 0.34 L/ac	8.7, 11.5 and 17.4 g/ac	Agral 90, Ag-Surf
Frontline	40 mL/ac Frontline A + 0.34 L/ac Frontline B	8.7, 11.5 and 17.4 g/ac	Agral 90, Ag-Surf
Spectrum	40 mL/ac Spectrum A + 0.6 L/ac Spectrum B	8.7, 11.5 and 17.4 g/ac	Agral 90, Ag-Surf

- 3. Crops:** Canada Prairie spring wheat, durum wheat, extra strong spring wheat, hard red spring wheat, soft white spring wheat, utility spring wheat.

Underseeding: Do not apply to spring wheat underseeded to legumes.

4. Weeds Controlled:

Weed	Stage	Rate
Wild oat – populations below 100 plants/m ² , green foxtail and volunteer oats	1 - 6 leaf, maximum of 4 main stem leaves and 2 tillers	11.5 g/ac
Wild oat, volunteer oat and green foxtail	1 - 6 leaf, maximum of 4 main stem leaves and 2 tillers	17.4 g/ac
Green foxtail ONLY	1 - 6 leaf, maximum of 4 main stem leaves and 2 tillers	8.7 g/ac
Green smartweed, redroot pigweed, volunteer canola*, wild mustard	2 to 6 leaf stage	11.5 g/ac
Shepherd's-purse	2 - 6 leaf stage	11.5 g/ac
Stinkweed	2 - 9 leaf stage	11.5 g/ac

* Will not control imidazolinone tolerant (Clearfield) canola volunteers.

Use 11.5 g/ac rate when wild oat infestations are below 100 plants/m² and when plants are actively growing.

Use 17.4 g/ac rate when wild oat infestations are greater than 100 plants/m², when tank mixing with a product that contains dicamba or when plants are not actively growing due to poor environmental conditions.

For green foxtail control only, use 8.7 g/ac.

Add non-ionic surfactant (Agral 90, Ag-Surf, Surf 92, Super Spreader, LI 700) at 0.25% v/v or 0.25 L per 100 L spray solution.

- 5. Weeds Suppressed:** None.

6. When Used:

Crop stage: 1 - 6 leaf stage (1 leaf to 4 leaves on the main stem, plus 2 tillers).

Weed stage: See above table.

7. How to Apply:

With: Ground equipment. Do not apply by air.

Rate: See above rate structure.

Water volume: 22.5 - 45 L/ac.

Pressure: 207 - 345 kPa.

Nozzles: The use of 80° or 110° flat fan nozzles is recommended for optimum spray coverage. Nozzles may be oriented 45° forward to enhance crop penetration and to give better weed coverage. In-line strainers and nozzle screens should be 50-mesh or coarser.

Mixing instructions: Use mixing instructions "b" on page 12.

Safety information, see page 25

Sprayer cleanup: Use cleanup method A on page 16.

- 8. Application Tips:** Wheat exposed to the following at application time could show unacceptable injury symptoms: water-logged or saturated soils, temperature extremes such as heat or freezing weather, drought, low fertility or plant disease. Weed control may also be reduced by these same conditions. Crop tolerance and weed control may be reduced if applications are made to plants growing under stress. Stress includes saturated or water logged soil, drought, extreme temperatures, low fertility or visible disease symptoms at application. Adopting practices to increase crop vigour will improve crop tolerance.
- 9. How it Works:** Flucarbazone-sodium is a systemic herbicide that is absorbed by both leaves and roots and moves rapidly to the growing point of the plant.
- 10. Expected Results:** Growth of susceptible plants stops soon after application. Symptoms include discolouration (yellowing, reddening and purpling), and complete control may take 1 to 2 weeks.
- 11. Effects of Rainfall:** Do not apply if rainfall is expected in 1 hour after application.
- 12. Movement in Soil:** None.
- 13. Cropping Restrictions:** The following crops may be planted 11 months after application:

Black soil zone: Barley, canola (all varieties), durum wheat, field bean, field peas*, flax, spring wheat.

Brown soil zone: Spring wheat.

Dark Brown soil zone: Barley, canola (all varieties), durum wheat, field peas*, flax, spring wheat.

Grey-Wooded soil zone: Barley, canola (all varieties), field peas*, spring wheat.

* Field peas may be grown the year following an Everest application where precipitation has been equal to or above the 10 year average (100 mm within 60 days during the growing season of the year of application) and where organic matter content is above 4% and soil pH is below 7.5.

Rotational crops can be adversely affected if rainfall is below normal (10 year average) during the year of application. Use certified seed and good agronomic practices to reduce the effect on rotational crops.

Everest applications to eroded knolls in the Dark Brown and Black soil zones with low organic matter (less than 2%) and high pH (greater than 7.5) or to Grey-Wooded soils with highly variable soil texture and organic matter may result in delayed development or reduced yield of rotational crop.

Grazing restrictions: Do not feed or graze treated fields. Wheat grain or straw from treated fields may be fed to livestock.

Other restrictions: Observe minimum interval to harvest of 80 days after treatment.

- 14. Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = >5,000 mg/kg.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Store in a cool, dry place and in such a manner as to prevent cross contamination with other pesticides, fertilizers, food, or feed. Store in original container and out of reach of children, preferably in a locked storage area. Everest 70 WDG is not affected by freezing. Avoid physical damage to Everest 70 WDG during storage and prior to mixing in spray tank.
- 17. Resistance Management:** See page 41 for information on resistance management.

Express SG (tribenuron-methyl)

Group 2

Manufacturer: E.I. duPont Canada Co.

- 1. Formulations:** Soluble granules; 50% (PCP# 28262); 480 g container.
- 2. Registered Mixes:** Credit, Credit 45, Factor 540, Glyphos, Maverick III, R/T 540, Roundup Transorb HC, Roundup Ultra 2, Roundup WeatherMax, Sharpshooter, Sharpshooter Plus, Touchdown IQ, Touchdown Total and Vantage Plus Max II (all glyphosate products present as potassium salts, isopropylamine salt, ammonium salt, or trimethylsulfonium salt).

Safety information, see page 25

Express SG (cont'd)**Mixing instructions:**

Note: Addition of non-ionic surfactant is required only when using rates of glyphosate that are less than 0.5 L/ac (glyphosate equivalent at 356 g/L).

Mixing instructions: Use mixing instruction "d" on page 13.

Note: Addition of non-ionic surfactant is required only when using rates of glyphosate that are less than 0.5 L/ac (glyphosate equivalent at 356 g/L).

- 3. Crops:** Pre-seed burn-off prior to seeding barley, canaryseed, oats, pulses (including dry beans*, fababeans*, lupins*, field peas*, soybeans*), summerfallow, and wheat (durum, spring and winter).

* **Express SG should not be used prior to registered pulse crops on soils with greater than 60% sand or less than 3% organic matter.**

- 4. Weeds Controlled:** Express + 0.5 L/ac glyphosate.

Canada fleabane	giant foxtail	narrow-leaved	volunteer canola (including
cow cockle	green foxtail	hawk's-beard	glyphosate tolerant)
common ragweed	hemp-nettle	redroot pigweed	volunteer flax
dandelion	kochia	Russian thistle	volunteer wheat
top growth control	lady's-thumb	stinkweed	wild buckwheat
downy brome	lamb's-quarters	volunteer barley	wild mustard
flixweed			wild oats

- 5. Weeds Suppressed:** Canada thistle.

6. When Used:

Crop stage: Spring wheat, winter wheat, durum or barley can be seeded 24 hours after application.

Weed stage: Apply to young, emerged actively growing weeds that are less than 10 cm tall or across and before the crop canopy closes.

Summerfallow: (control of fall rosettes and spring seedlings of narrow-leaved hawk's-beard and stinkweed) Apply the tank mix in the spring after emergence, up to the early flowering stage. Only weeds that have emerged at the time of application will be controlled.

7. How to Apply:

With: Ground equipment. Do not apply by air.

Rate: 6 g/ac of Express SG in a tank mix with 0.5 L/ac of glyphosate. Refer to product label for list of weeds controlled.

Surfactant: 3.5 L/1,000 L of solution (only required when using rates of glyphosate that are less than 0.5 L/ac).

Water volume: 40 L/ac.

Pressure: 210 - 275 kPa.

Nozzles: Use flat fan nozzles. Do not use flood jet nozzles. Use 50 mesh screen.

Sprayer cleanup: To avoid subsequent injury to crops other than wheat, spring barley or oats, immediately after spraying and prior to spraying other crops use sprayer cleanup method A on page 16.

- 8. Application Tips:** Effectiveness may be reduced if spray mixture remains in the tank for more than 24 hours.

- 9. How it Works:** Absorbed by foliage and roots, inhibits cell elongation.

- 10. Expected Results:** Express SG stops the growth of susceptible weeds immediately. However, typical systems (discolouration) of dying weeds may not be noticeable for 1 - 3 weeks after application, depending on growing conditions and weed susceptibility. Degree of control and duration of effect depend on weed sensitivity, weed size, spray coverage and growing conditions. Favorable growing conditions following treatment promote the activity of Express SG while cold, dry conditions delay the activity.

- 11. Effects of Rainfall:** If rain occurs soon after application, control may be reduced; 1 hour of dry weather is needed to allow Express SG to be absorbed by weed foliage.

- 12. Movement in Soil:** Express SG moves little in the soil. Its life in the soil is very short.

Express SG (cont'd)

- 13. Cropping Restrictions:** A minimum recropping interval of 2 months should be left between the application of Express SG and seeding of the next crop. The following crops can be seeded two months after application of Express SG herbicide: canola, flax, lentils and alfalfa.
- 14. Toxicity:** Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) = >5,000 mg/kg. May irritate eyes, nose, throat and skin.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Store in a cool, dry place.
- 17. Resistance Management:** See page 41 for information on resistance management.



Caution Poison

Express Pro

Manufacturer: E.I. duPont Canada Co.

Group 2

Formulations

Product	Company	Active Ingredient	Container size
Express Pro (PCP# 29212)	E.I. duPont Canada Co.	Tribenuron methyl 42.9%, metsulfuron methyl at 8.6% both as soluble granules	0.20 – 600 kg

Crops and Staging

Crop	Stage
Summerfallow	Preplant before wheat (spring durum and winter), barley

Note: Must be mixed with glyphosate (present as a potassium salt or isopropylamine salt or ammonium salt or trimethylsulfonium salt). Do not apply to wheat and barley underseeded to legumes or grass.

Weeds Controlled, Rates and Staging

Express Pro + ½ L glyphosate (360 gm active ingredient/L)

Weeds Controlled	Stage	Weeds Suppressed	Stage
Volunteer canola* (incl. glyphosate tolerant)	Any stage		
Canada fleabane, cleavers, common ragweed, narrow-leaved hawksbeard*, scentless chamomil, white cockle	Up to 8 cm	Night flowering catchfly	Up to 8 cm
Chickweed	1 – 6 leaf	Canada thistle	Rosette
Dandelion*, downy brome, flixweed, giant foxtail, hemp nettle, kochia, lady's thumb, lamb's-quarters, Persian dandel, redroot pigweed, Russian thistle, stinkweed, volunteer barley, volunteer flax, volunteer wheat, wild mustard, wild oats	Up to 15 cm		
Cow cockle, wild buckwheat	Up to 3 leaf		

*Residual control.

Registered Tank Mixes

If using lower than the ½ L rate of glyphosate, adjuvant is required with the mix.

Application Information

How to Apply: Ground applications only. Do not apply by air. Apply at 7 gm/acre of Express Pro + ½ L of glyphosate (356/360 mL active ingredient/L).

Safety information, see page 25

Express Pro (cont'd)

Water Volume: Ground (22.5 - 45 L/acre).

Nozzles: Flat fan, use 50 mesh filter screens or larger.

Pressure: Reduce drift with high water volume, low pressure and coarse spray. Do not apply with more than 275 kPa pressure.

Application Tips

Do not use more than 7 gm/ac/year. Do not apply to crops underseeded to legumes or grasses. With any summerfallow treatment, allow at least 10 days to elapse between treatment and tillage. Only weeds emerged at time of application will be controlled. Weeds must be actively growing at time of application or control might be reduced. Do not re-enter treated fields until 12 hours after application. Once dissolved, Express Pro will not settle out, even if the sprayer is parked for long periods of time. Spray preparation should be used within 24 hours or product degradation may occur.

How it Works

Express Pro rapidly stops growth of susceptible weeds. However, typical symptoms (discoloration) of dying weeds may not be noticeable for 1 to 3 weeks after application, depending on growing conditions and weed susceptibility. Degree of control and duration of effect depend on weed sensitivity, weed size, spray coverage and growing conditions. Activity of the herbicide mixture may be delayed by cold, dry conditions after application.

Effect of Rainfall: Heavy rainfall immediately after application may wash the herbicide off the foliage, which may reduce the effectiveness of Express Pro. Do not apply if rain is forecast for the time of application.

Restrictions

Re-cropping: Fields treated with Express Pro may be seeded to wheat (spring, durum or winter) or spring barley a minimum of 24 hours after application. The following crops may be seeded 10 months after application: canola, peas and flax.

Environmental Hazards

Express Pro is toxic to aquatic organisms and non-target terrestrial plants.

Buffer zone guideline: Use a buffer zone of 4 meters for terrestrial habitats and 1 meter minimum for aquatic habitats.

Leaching: The use of this chemical may result in contamination of groundwater, particularly in areas where soils are permeable (e.g. sandy soil) and/or the depth to the water table is shallow.

Runoff: To reduce runoff from treated areas into aquatic habitats, consider the characteristics and conditions of the site before treatment. Site characteristics and conditions that may lead to runoff include, but are not limited to heavy rainfall, moderate to steep slope, bare soil, poorly draining soil (e.g. soils that are compacted or fine textured such as clay).

Toxicity: Low acute mammalian toxicity. Acute oral LD₅₀ (rats) >5,000 mg/kg.

Storage

Store product in original container only, away from other pesticides, fertilizer, food or feed. Not for use or storage in or around the home. Keep container closed.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.

FlaxMax DLX

(tepraloxydim + clopyralid + MCPA ester)

Manufacturer: BASF Canada

Group 1,4

- 1. Formulations: Equinox:** 200 g/L tepraloxydim as an emulsifiable concentrate (PCP# 27603); 1.62 L + 4.05 L of Merge in a dual chamber.

Safety information, see page 25

FlaxMax DLX (cont'd)

FlaxMax: 50 g/L clopyralid + 280 g/L. **MCPA Ester:** 2 x 8.0 L (PCP# 23993/25819).

Surfactant: Merge (PCP# 25818): Use only Merge and mix to a final ratio of 5.0 L of Merge in 1,000 L of diluted spray solution (0.5% Merge v/v). The surfactant is in the package.

2. Registered Mixes: None.

3. Crops: Flax (excluding low linolenic acid varieties).

4. Weeds Controlled:

Annual grass weeds at the 1 - 6-leaf stage:

green foxtail	volunteer barley	volunteer wheat	wild oat
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Annual broadleaf weeds at the 2 to 4 leaf stage:

annual sow thistle	redroot pigweed	smartweed	volunteer oats
common groundsel	Russian pigweed	stinkweed	volunteer sunflower
flixweed	scentless chamomile	tartary buckwheat	wild buckwheat
lamb's-quarters	shepherd's-purse	volunteer canola	wild mustard

Perennial weeds:

Canada thistle*	dandelion**	perennial sow thistle***
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* Apply from 10 cm until early bud stage. This treatment will provide season long control of light Canada thistle infestations with some regrowth in the fall.

** Apply at the spring rosette stage.

*** When applied to top growth.

5. Weeds Suppressed: None.

6. When Used:

Crop stage: Flax: 5 - 15 cm tall. Early spraying will reduce the risk of crop injury.

Weed stage: See weed control chart above.

7. How to Apply:

With: Ground equipment.

Rate: 20 ac per case.

Water volume: 40 L/ac.

Pressure: 240 - 275 kPa.

Nozzles: Flat fan nozzles tilted 45° forward preferred. The use of flood jet or hollow cone nozzles is not recommended because of uneven and inadequate spray coverage.

8. Application Tips: Early spraying will reduce the risk of crop injury. Ensure thorough and uniform spray coverage over the entire leaf area of the target weeds. When weeds are stressed due to drought, flooding or prolonged hot or cool temperatures (15°C or less), control can be reduced or delayed. Do not spray FlaxMax DLX if temperatures of +5°C or lower are forecasted within 3 days of application. Temperatures near freezing (below 5°C) will prevent optimum herbicide performance, as weeds are not actively growing. Weed escapes may occur under prolonged stress conditions or low fertility. Do not make applications to weeds stressed longer than 20 days due to lack of moisture as unsatisfactory control can result. Ensure thorough and uniform spray coverage over the entire leaf area of the target weeds. Do not apply FlaxMax DLX herbicide directly to or otherwise permit it to come into contact with sunflowers, legumes, fruit or vegetable crops, flowers or other desirable broadleaf plants, and take precautions to avoid spray mists drifting onto them. Equipment used to apply FlaxMax DLX herbicide should not be used to apply other pesticides to sensitive crops without thorough cleaning.

9. How it Works: Tepraloxymid Equinox is a contact and systemic herbicide. Uptake is primarily through the leaves, and thorough coverage of foliage is important for consistent control. Susceptible annual grasses stop growing and slowly turn brown. Complete control takes 7 - 21 days. Clopyralid is a growth regulator type of herbicide, which is primarily absorbed through the foliage and is translocated to all parts of the plant causing leaves and stems to twist, yellow and then die. MCPA is a systemic herbicide for broadleaf weeds that is translocated throughout the plant causing rapid undifferentiated growth, which usually results in the death of susceptible weeds.

FlaxMax DLX (cont'd)**10. Expected Results:**

Grasses: Susceptible annual grasses stop growing and slowly turn brown. Complete control takes 7 - 21 days.

Broadleaf weeds: Weeds start to twist after spraying; after twisting and bending, plants turn brown and die. Difficult to control weeds such as Canada thistle and wild buckwheat stop growing, change colour to dark green and then turn yellow before they die. Death may not occur for 14 - 21 days after application. Some weak Canada thistle regrowth may occur by the end of the season.

11. Effects of Rainfall: Do not apply if rain is forecast within 6 hours of application.**12. Movement in Soil:** Tepraloxym Equinox is relatively immobile in the soil and breaks down quickly. Clopyralid is somewhat soluble in water, but is generally not mobile in soil under typical prairie conditions. MCPA is readily leached from the soil.**13. Cropping Restrictions:**

Grazing restrictions: Do not graze the treated crop or cut for livestock feed.

Succeeding crops: Fields previously treated with FlaxMax DLX herbicide can be seeded to wheat, barley, oats, rye, corn, flax, canola, sugar beets, mustard, or they should be summerfallowed. Field peas can be grown the following year (10 months after application). Do not seed to crops other than those listed above for at least one clear year following treatment.

14. Toxicity:

Clopyralid: Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) = >2,000 mg/kg. Acute oral LD₅₀ (bees) = >100 µg/bee. Extremely low toxicity to fish.

MCPA: Moderate acute mammalian toxicity. Acute oral LD₅₀ (rats) = technical 700 - 880 mg/kg. Low toxicity to fish. May cause burns upon contact with skin and eyes, and it can be absorbed through the skin.

15. Precautions, First Aid: Check label for first aid information.**16. Storage:** Store in original, tightly-closed container and do not allow water to be introduced into this container. Store in cool (above 5°C), dry and well ventilated area. If product is frozen, bring to room temperature and agitate before use.**17. Resistance Management:** See page 41 for information on resistance management.**Fortress** (*triallate + trifluralin*)**Group 8,3**

Manufacturer: Gowan Company

1. Formulations: Granular; 10% triallate + 4% trifluralin (PCP# 19521); 453.6 kg tote.**2. Registered Mixes:** None.**3. Crops:** Barley (8.9), flax (8.0), durum wheat (9.0), mustard (9.0), rapeseed (9.0) (including canola), spring wheat (8.2).**4. Weeds Controlled:** Green foxtail (7.1), wild oats (7.3), yellow foxtail.**5. Weeds Suppressed:** Kochia, lamb's-quarters, redroot pigweed, Russian thistle, wild buckwheat.**6. When Used: Spring:** Pre-plant incorporated on barley, flax, spring and durum wheat and rapeseed (including canola). Do not apply pre-plant with wheat in soils with 0 - 4% organic matter.

Fall: Apply in fall, after September 15 until soil freeze-up. Do not apply pre-plant with wheat in soil with less than 2% organic matter.

Note - Fall applications: Where erosion may be a problem, maximize crop residue cover with only one fall tillage incorporation.

Safety information, see page 25

Fortress (cont'd)

7. How to Apply:

With: Aircraft or ground equipment.

Rate:

Fall Granular Fortress Rates (kg/ac)

Crops	Organic matter				
	Less than 2%	2 - 4 %	4 - 6 %	Greater than 6%	Greater than 8%
Barley	4.5	5.7	5.7	6.9	6.9
Durum wheat, sping wheat	—	4.5	5.7	5.7	6.9
Flax*, mustard, rapeseed	5.7	5.7	5.7	6.9	6.9

Spring Granular Fortress Rates (kg/ac)

Crops	Application timing	Organic matter				Seeding depth (cm)
		Less than 2%	2 - 4 %	4 - 6 %	Greater than 6%	
Barley		4.5	5.7	5.7	6.9	5 - 7.5
Durum wheat, sping wheat	Before seeding	—	—	4.5	5.7	5 - 7.5
Flax*, mustard, rapeseed		5.7	5.7	5.7	6.9	as desired

Fall Surface Granular Fortress Rates (kg/ac)

Crops	Organic matter				Seeding depth (cm)
	Less than 2%	2 - 4 %	4 - 6 %	Greater than 6%	
Barley	4.5	5.7	5.7	6.9	5 - 7
Durum wheat, sping wheat	—	4.5	5.7	5.7	5 - 7
Flax*, mustard, rapeseed	5.7	5.7	5.7	6.9	as desired

* Do not use on low linolenic acid varieties of flax.

Incorporation:

Time: First incorporation within 24 hours, second incorporation can be either in the fall or spring.

Implement: Use a double disc or light duty cultivator plus harrows. Harrowing does not provide effective incorporation if compacted soil prevents penetration of harrow teeth, if trash accumulates in harrow section or if harrows bounce.

- 8. Application Tips:** Calibrate equipment to deliver desired amount of product. Use only a hoe-drill or a double disc press drill to seed barley or wheat into a Fortress-treated field. Do not apply to soil with less than 2% organic matter if it is to be seeded to wheat. Do not apply Fortress for wheat on land that has been treated with trifluralin since June 1 of the previous year.

Seeding: Flax, mustard and rapeseed can be seeded in treated layers. Barley and wheat are more sensitive and should be planted 6.0 - 7.5 cm. Wheat must be seeded at least 1.0 cm below the treated layer. Do not seed deeper than 7.5 cm. To ensure an even crop stand, increase the usual seeding rate of barley and wheat by 10%. Seed into warm, moist seedbed.

Fall surface application: Where fields are prone to water and/or wind erosion and fall tillage is therefore undesirable, fall surface applications should be made after October 15 or within three weeks of soil freeze-up (average soil temperature at the 5 cm depth should be 4°C or less). Fall surface application should be made to standing stubble, chemical fallow or summerfallow fields in a state of low soil erodibility. Avoid smooth, hard packed soil conditions in summerfallow which may allow granules to drift. Surface applications should not be made to fields covered in snow or that have excessive crop residue, which will not allow

Fortress (cont'd)

granules contact with soil. Under excessively warm and/or wet conditions between application and crop emergence, control may be reduced. For best results under heavy wild oat infestations, use the incorporated treatments only.

- 9. How it Works:** Absorbed by wild oat shoots and foxtail roots, usually resulting in death before emergence. Under dry conditions, some wild oats and foxtail may emerge before being killed.

10. Expected Results:

Weeds: Wild oats and foxtail die before they emerge. Weed control may be reduced under conditions of prolonged, cool soil temperatures at the time of germination or extreme drought in spring.

Crops: Thinning in barley and wheat are known to occur under conditions of heavy rainfall and/or cold weather after application and before crop emergence. In most cases, thinning is more than offset by tillering. Some thinning may be noted on eroded knolls. Poor results may be expected if there is incomplete incorporation due to wet, cloddy soil or heavy trash, very dry soil conditions in spring or prolonged cool soil temperatures at time of germination. Ridges left by seeding may disrupt the treated layer and allow escapes.

- 11. Effects of Rainfall:** Moisture is required for activation. Rainfall of at least 1.5 cm within 2 weeks of application in the spring is required to ensure maximum performance.

- 12. Movement in Soil:** Negligible.

13. Cropping Restrictions:

Grazing restrictions: Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.

Succeeding crops: Under normal conditions, Fortress carryover will not harm crops grown in rotation. As a precaution, domestic oats, sugar beets, creeping red fescue and small-seeded grasses such as timothy and canary seed should not be grown in rotation following a Fortress-treated crop.

- 14. Toxicity:** Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) = >5,000 mg/kg. May cause skin and eye irritation.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Store in a dry place.
- 17. Resistance Management:** See page 41 for information on resistance management.

Frontline XL

(florasulam + MCPA ester)

Manufacturer: Dow AgroSciences Canada Inc.

Group 2,4



Caution Poison

- 1. Formulations: Frontline XL:** 4 g/L florasulam, + 280 g/L MCPA Ester (PCP# 28804); 10 L/jug, 120 L drum.
- 2. Registered Mixes: Barley, durum wheat, spring wheat:** Assert 300 SC (670 mL/ac) + acidulate, Puma¹²⁰ Super (156 mL/ac) for green foxtail only. Axial 100 EC (243 mL/ac) + 283 mL/ac Adigor.
- Durum wheat, spring wheat:** Everest, 70 DF solupak (17.4/ac) + non-ionic surfactant, Horizon (95 mL/ac) + Score adjuvant, Simplicity (200 mL/ac).
- 3. Crops:** Barley, oats, spring wheat (including durum).
- 4. Weeds Controlled:**

ball mustard
chickweed (8.7)
cleavers (8.8)
common ragweed

flixweed
hemp-nettle (7.8)*
lamb's-quarters (8.9)
redroot pigweed (8.4)*

shepherd's-purse
smartweed (8.6)
stinkweed (8.9)

volunteer canola (8.9)
(all canola)
wild buckwheat (8.2)
wild mustard

* Optimum control can be achieved with the addition of an extra 55 mL/ac MCPA IV 500.

Safety information, see page 25

5. Weeds Suppressed:

annual sow thistle (8.1)
Canada thistle (6.4)
(top growth control)

dandelion (seedlings (6.6)
and overwintered rosettes
less than 15 cm)

perennial sow thistle (7.5)
(top control only)
stork's-bill (8.0)

6. When Used:

Crop stage: Apply to actively growing barley, oats or spring wheat. Apply when the majority of the crop is past the 2 leaf stage and up to the 6 leaf stage. When tank mixing, always check the tank mix partner(s) recommendations for crop staging restrictions.

Weed stage: 2 - 4 leaf stage.

7. How to Apply:

With: Ground equipment only. With a sprayer that can apply 40 L/ac spray solution. Do not apply by air.

Rate: Frontline XL: 506 mL/ac.

Water volume: 40 L/ac.

Pressure: Use low pressures 200 to 275 kPa.

Nozzles: Use nozzles that deliver higher volumes and coarser droplets. Use 40 L/ac of spray solution.

Mixing instructions: Only use sprayers that have good agitation. Ensure the sprayer is properly cleaned prior to adding Frontline. Use mixing instructions "b" on page 12.

Sprayer cleanup: Use cleanup method A on page 16.

- 8. Application Tips:** Do not apply to crops underseeded to legumes. Apply Frontline early post-emergence, to the main flush of broadleaf weeds. Warm moist conditions that promote active weed growth, small weed size and competitive crop and good growing conditions after application will optimize the weed control. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed, and regrowth may occur. For best results, ensure adequate spray coverage of the target weeds. Only weeds that are emerged at time of application will be controlled. If the foliage of the weed is wet at the time of application, control may be reduced.
- 9. How it Works:** Frontline tank mix is readily absorbed by the weed foliage. The florasulam inhibits the ALS enzyme in plants, resulting in a rapid halt in growth followed by yellowing and reddening of the foliage, followed by the death of susceptible weeds. The MCPA portions of Frontline mimic naturally occurring plant hormones and control the weeds by disrupting normal plant growth patterns.
- 10. Expected Results:** Weeds susceptible to Frontline A will stop growing almost immediately. The weeds turn yellow or reddish. Symptoms such as yellowing and red colouration may not be noticeable for 1 - 2 weeks. Some twisting may also be observed on weeds sensitive to MCPA. Warm moist conditions, small weed size and competitive crop will optimize weed control provided by Frontline.
- 11. Effects of Rainfall:** Heavy rainfall immediately after application may wash the chemical off the foliage, and a repeat treatment may be required. Do not apply if rainfall is forecast for the time of application.
- 12. Movement in Soil:** Frontline A is not persistent in soil. Dissipation of florasulam occurs primarily through microbial degradation. Field studies in a wide-variety of soils have shown the half-life of florasulam in soil to range from 2 - 18 days. Florasulam degradation is not affected by soil type or by soil pH, but is moisture and temperature-dependent. The herbicide is somewhat soluble in water, but is generally not mobile in soil under typical prairie conditions. Frontline B (MCPA Ester) is readily leached from soil.
- 13. Cropping Restrictions:**

Grazing restrictions: Do not graze treated crop or cut for feed within 7 days of application.

Drift: Do not allow spray mist to drift since drift can cause damage to non-target crops and plants. Do not apply when winds are gusty or in excess of 15 km/h. When spraying, avoid combinations of pressure and nozzle type that will result in fine particles (mist), which are more likely to drift.

Succeeding crops: Fields treated with Frontline herbicide tank mix can be seeded the following year to barley, canola, peas, wheat or summerfallowed. Do not seed crops other than those listed above for at

Frontline XL (cont'd)

least one year after treatment. For more cropping and use information, contact your Dow AgroSciences Canada Inc. representative.

Other restrictions: Do not harvest the treated mature crop within 60 days of application.

14. **Toxicity:** Frontline A has extremely low acute toxicity. Acute LD₅₀ = >6,000 mg/kg. Frontline B has moderate acute toxicity. Acute LD₅₀ of technical = 700 - 800 mg/kg.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Store away from food, feedstuff, fertilizer, seeds, insecticides, fungicides or other pesticides or herbicides. Store in a dry, heated storage. If products are frozen, bring to room temperature and agitate before use. Soak up small amounts of spill with absorbent clays.
17. **Resistance Management:** See page 41 for information on resistance management.

Frontline 2,4-D (florasulam + 2,4-D)

Manufacturer: Dow AgroSciences Canada Inc.

Group 2,4



Warning Poison

1. **Formulations:** SC; 50 g/L florasulam (PCP# 27242); 1.6 L jug.
564 g/L 2,4-D Ester LV 600 (PCP# 27243); 2 x 8.0 L jugs.
2. **Registered Mixes: Durum wheat, spring wheat:** Everest 70 DF solupak (17.4 g/ac) + non-ionic surfactant. Assert 300 SC (670 mL/ac) plus acidulate; Puma¹²⁰ Super (156 mL/ac) for green foxtail only. Simplicity (200 mL/ac).
3. **Crops:** Durum wheat, spring wheat.
4. **Weeds Controlled:**

annual sow thistle	common ragweed	plantain	tartary buckwheat
annual sunflower	dandelion*	prickly lettuce	vetch
ball mustard	flixweed	redroot pigweed	volunteer canola***
bluebur	kochia**	Russian thistle	wild buckwheat
burdock	lady's-thumb	shepherd's-purse	wild mustard
chickweed	lamb's-quarters	smartweed	wild radish
cleavers	narrow-leaved	stinkweed	
cocklebur	hawk's-beard****		

* Seedlings and overwintering rosettes.
** Up to 5 cm in height.
*** All types of volunteer canola including herbicide tolerant.
**** 1-2 leaf stage.

5. Weeds Suppressed:

- | | | | |
|-----------------|-------------|-------------|------------------------|
| Canada thistle* | dandelion** | hemp-nettle | perennial sow thistle* |
|-----------------|-------------|-------------|------------------------|
- * Top growth control only.
** Rosettes greater than 6" (15 cm) will be suppressed.

6. When Used:

Crop stage: Apply to actively growing durum wheat or spring wheat. Apply when the majority of the crop is in the late 3 leaf stage up to the 6 leaf stage. When tank mixing, always check the tank mix partner(s) recommendations for crop stage restrictions.

7. How to Apply:

With: Ground equipment only. With a sprayer that can apply 40 L/ac of spray solution. Do not apply by air.

Rate: Frontline 2,4-D "A": 40 mL/ac. + Frontline 2,4-D "B": 405 mL/ac. with registered grass tank mixes except Simplicity.

Safety information, see page 25

Rate of Frontline 2,4-D when mixed with Simplicity cross spectrum grass and broadleaf herbicide may be applied at Frontline 2,4-D "A" : 27 ml/ac + Frontline 2, 4-D "B": 248 ml/ac. At this rate, Frontline 2,4-D will control wild buckwheat and labelled weeds at the 248 ml/acre 2,4-D rate.

Water volume: 40 L/ac.

Pressure: Use low pressures 200 to 275 kPa.

Nozzles: Use nozzles that deliver higher volumes and coarser droplets.

Mixing instructions: Only use sprayers that have good agitation. Ensure the sprayer is properly cleaned prior to adding Frontline 2,4-D. Use mixing instructions "b" on page 12.

Sprayer cleanup: Use cleanout method A on page 16.

- 8. Application Tips:** Do not apply to crops underseeded to legumes. Apply Frontline 2,4-D early post-emergence to the main flush of broadleaf weeds. Warm moist conditions that promote active weed growth, small weed size, competitive crop and good growing conditions after application optimize weed control. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed, and re-growth may occur. For best results, ensure adequate spray coverage of the target weeds. Only weeds that are emerged at time of application will be controlled. If the foliage of the weed is wet at the time of application, control may be reduced.
- 9. How it Works:** Florasulam SC is taken up by leaves and stops growth of susceptible weeds rapidly via inhibition of the ALS enzyme. 2,4-D is a systemic, non-selective herbicide, which readily moves through the foliage and root system. It inhibits pigment, including chlorophyll, leading to plant death.
- 10. Expected Results:** Florasulam A symptoms will initially appear in the upper regions of the plant. Newer leaves start to yellow and wilt, followed by a loss of green colour. Symptoms will spread to the rest of the plant with some weeds showing purpling or reddening. Under ideal conditions, complete control may occur within 7 - 10 days after application. Plants susceptible to 2,4-D will become malformed before they die.
- 11. Effects of Rainfall:** Do not apply if rainfall is expected within 2 hours.
- 12. Movement in Soil:** Florasulam SC is not persistent in soil. Field studies in a wide variety of soils have shown the half-life of Florasulam SC in soil to range from 2 - 18 days. Florasulam SC degradation is not affected by soil type or by soil pH, but is moisture and temperature dependent. Florasulam SC is somewhat soluble in water, but is generally not mobile in soil under typical prairie conditions. 2,4-D leaching does not pose a problem.
- 13. Cropping Restrictions:**

Drift: Do not allow spray mist to drift since drift can cause damage to non-target crops and plants. Do not apply when winds are gusty or in excess of 15 km/h. When spraying, avoid combinations of pressure and nozzle type that will result in fine particles (mist), which are more likely to drift.

Succeeding crops: Fields treated with Frontline 2,4-D herbicide tank mix can be seeded the following year to barley, canola, peas, wheat or summerfallowed. Do not seed crops other than those listed above for one year after treatment.

Grazing restrictions: Do not graze treated areas within 7 days of application. Do not harvest for livestock feed until 30 days after treatment. Withdraw meat animals from treated fields at least 3 days before slaughter.
- 14. Toxicity:** Florasulam SC has extremely low acute toxicity. Acute LD_{50} = >6,000 mg/kg. 2,4-D has moderate acute mammalian toxicity. Acute oral LD_{50} (rats) = technical 300 - 1,200 mg/kg. Some formulations may cause skin irritation. Some formulations are toxic to fish. May cause burns and can be absorbed through the skin.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Store away from food, feedstuff, fertilizer, seeds, insecticides and fungicides or other pesticides or herbicides. Store in dry, heated storage. If products are frozen, bring to room temperature and agitate before use. Soak up small amounts of spill with absorbent clays.
- 17. Resistance Management:** See page 41 for information on resistance management.

Fusion (*fenoxaprop-p-ethyl* + *fluazifop-p-butyl*)

Group 1

Manufacturer: Bayer CropScience Inc.



Caution Poison

1. **Formulations: Component #1:** Emulsifiable concentrate; 80.5 g/L fenoxaprop-p-ethyl (PCP# 22845); 3.7 L jug.
Component #2: Emulsifiable concentrate; 125 g/L fluazifop-p-butyl (PCP# 21208); 6.5 L jug.
2. **Registered Mixes:**
Canola and triazine tolerant canola: Liberty 150 SN (1.1 - 1.35 L/ac), Lontrel (227 mL/ac), **Argentine canola varieties only:** Muster (8 - 12 g/ac - no surfactant required).
Flax: Buctril M (400 mL/ac) including low linolenic acid varieties, Curtail M (600 - 800 mL/ac) including low linolenic acid varieties, MCPA Ester or Amine 500 (340 mL/ac).
3. **Crops:** Canola (triazine tolerant canola), flax (including low linolenic acid varieties), field peas, lentils, mustard.
4. **Weeds Controlled:** Barnyard grass, green foxtail, Persian dandel, volunteer barley, volunteer wheat, wild oats.
5. **Weeds Suppressed:** None.
6. **When Used:**
Crop stage: Do not apply after the 5 leaf stage of canola. Do not apply later than the 6th node stage of lentils.
Weed stage: Apply to young emerged, actively growing weeds. Weeds that emerge after application will not be controlled.
 Annual grassy weeds: 1 - 6 leaf stage.
7. **How to Apply:**
With: Ground equipment. Do not apply by air.
Rate: Component #1 at 185 mL/ac and **Component #2** at 325 mL/ac.
Caution: Both components of the Fusion tank mix must be applied at the recommended rate or a reduction in grassy weed control may result.
Water volume: 22.5 - 45 L/ac.
Pressure: 275 kPa or 310 kPa if using check valves.
Nozzles: The use of 80° or 110° flat fan nozzles is recommended for optimal spray coverage.
Mixing instructions: See mixing instructions "d" on page 13.
8. **Application Tips:** A time interval of 4 days prior to application or 4 days after application of Fusion tank mix is required before any other pesticide can be applied, unless registered as a tank mix. During periods of stress, plants are not actively growing. When daytime temperatures before and after application are very hot, combined with very dry conditions and low humidity, plants are under stress. Application of Fusion during these periods may result in substantially reduced control. Application of the spray at a forward angle of 45° will result in better penetration of the canopy and better coverage. Do not apply to crop stressed by severe weather conditions, frost, low fertility, drought, water saturated soil, disease or insect damage as crop injury may result.
9. **How it Works:** Contact as well as systemic, no soil activity. Regions of high meristematic activity such as root and shoot tips are known to be affected.
10. **Expected Results:**
Grassy weeds: Reduction of leaf growth and chlorotic blotching within 1 - 3 days after application. Initial development of leaf chlorosis within 5 - 8 days after application and death within 14 - 21 days after application.
11. **Effects of Rainfall:** No effect 2 hours after application.
12. **Movement in Soil:** No soil movement. This product will not leach into the soil.

Fusion (cont'd)

13. Cropping Restrictions: Grazing restrictions: Do not graze treated fields prior to harvest. Pre-harvest interval: Canola: 80 days, Flax: 80 days, Lentils: 82 days, Field peas: 75 days, Mustard: 70 days.

14. Toxicity:

Component #1 (fenoxaprop-p-ethyl): Acute oral LD₅₀ (rats) = 3,355 mg/kg. May cause eye irritation and severe irritation of the skin.

Component #2 (fluazifop-p-butyl): Acute oral LD₅₀ (rats) = 2,451 mg/kg.

Warning: Experimental feeding studies in rats have demonstrated that the active ingredient in **Component #2** can produce birth defects and other adverse effects in the developing fetus of rats. Women capable of bearing children should be particularly careful when handling this product. Occupational exposure to this product will be reduced by strict adherence to the handling precautions. Use directions provided.

15. Precautions, First Aid: Check label for first aid information.

16. Storage: Keep away from fire, open flame or other heat sources. Do not store below freezing. If stored for 1 year or longer, shake well before using. Keep in original container during storage.

17. Resistance Management: See page 41 for information on resistance management.

Glyphosate (Cheminova Glyphosate, Clearout 41, Credit; Credit 45; Factor 540; Glyfos, Knockout, Maverick III; NuGlo; R/T 540; Roundup Transorb II; Roundup Ultra 2; Roundup Weather Max; Sharpshooter; Sharpshooter Plus; Touchdown iQ; Touchdown Total; Traxion; Vantage Plus Max II, Wise Up)



Caution Poison



Warning Irritant

Manufacturer: Numerous

Group 9

Formulations

Product	Company	Active ingredient	Formulation	Container size
Cheminova Glyphosate Soluble Concentrate Herbicide (PCP# 26828)	Cheminova	356 g/L	Solution	10 L
Clearout 41 (PCP# 28322)	Albaugh Inc.	356 g/L	Solution	115 L, 1000 L
Credit (PCP# 25866)	Nufarm Agriculture	356 g/L	Solution	10 L, 450 L
Credit 45 (PCP# 29124)	Nufarm Agriculture	450 g/L	Solution	10 L, 115 L, 450 L, 1000 L
Factor 540 (PCP# 27988)	IPCO	540 g/L	Solution	10 L, 115 L, 450 L
Glyfos (PCP# 27287)	Cheminova	360 g/L	Solution	10 L, 150 L, 450 L, 1000 L
KnockOut Extra (PCP# 29266)	Libertas Now Inc.	360 g/L	Solution	9.5 L, 30 L, 113 L, 940 L, 1040 L
Maverick III (PCP# 29033)	Dow AgroSciences	480 g/L	Solution	10 L, 115 L, 450 L
NuGlo (PCP# 29470)	Nufarm Agriculture	450 g/L	Solution	10 L, 450 L, 1000 L
R/T 540 (PCP# 28487)	Monsanto	540 g/L	Solution	10 L, 115 L, 450 L
Roundup Transorb HC (PCP# 28198)	Monsanto	540 g/L	Solution	10 L, 115 L, 450 L, 1150 L
Roundup Ultra 2 (PCP# 28486)	Monsanto	540 g/L	Solution	10 L, 115 L, 450 L
Roundup WeatherMax (PCP# 27487)	Monsanto	540 g/L	Solution	10 L, 115 L, 450 L, 1150 L

Safety information, see page 25

Glyphosate (cont'd)

Product	Company	Active ingredient	Formulation	Container size
Sharpshooter (PCP# 28631)	UAP	356 g/L	Solution	10 L, 1000 L
Sharpshooter Plus (PCP# 28623)	UAP	360 g/L	Solution	10 L, 1000 L
Touchdown iQ (PCP# 27192)	Syngenta	360 g/L	Solution	10 L, 115 L, 450 L
Touchdown Total (PCP# 28072)	Syngenta	500 g/L	Solution	10 L, 115 L, 450 L
Traxion (PCP# 29201)	Syngenta	500 g/L	Solution	450 L
Vantage Plus Max II (PCP# 28840)	Dow AgroSciences	480 g/L	Solution	10 L, 115 L, 450 L
Wise Up (PCP# 29126)	Adjuvants Plus Inc.	356 g/L	Solution	115 L, 1000 L

Cropland Uses

Annual weed control prior to crop emergence or in summerfallow – all crops.

Quackgrass control – prior to seeding or after harvest.

Canada thistle control – summer-fallow, shelterbelts and post-harvest.

Dandelion control – prior to crop emergence or post harvest.

Other perennial weeds control – summerfallow, shelterbelts and post-harvest.

Spot treatments (in-crop) of perennial weed control – cereals, corn, soybean and forages.

Pre-harvest control of quackgrass, Canada thistle, milkweed, toadflax, dandelion, season-long control of perennial sow-thistle, and harvest management.

Weed control in glyphosate tolerant crops: canola, corn and sugar beet.

Post-harvest stubble treatments – all crops.

Weed control in non-crop areas: industrial, right-of-way, and recreational and public areas.

Brush control, turf renovation, directed application in woody nursery stock, roadsides and shelterbelts.

Weeds Controlled

Annual

Annual bluegrass (9.0)
Annual sow-thistle
Barnyard grass
Canada fleabane
Common chickweed
Common ragweed
Corn spurry
Crabgrass
Dodder

Downy brome
Flixweed
Green foxtail (7.9)
Green smartweed
Hemp-nettle
Kochia
Lady's-thumb
Lamb's quarters
Narrow-leaved hawk's beard

Narrow-leaved vetch
Night-flowering catchfly
Persian dandel
Prickly lettuce
Red root pigweed
Round-leaved mallow
Russian thistle
Shepherd's-purse
Smooth pigweed

Stinkweed
Stork's-bill
Volunteer flax
Volunteer mustard
Volunteer wheat
Wild mustard
Wild oats
Wild tomatoes

Perennial

Alfalfa
Canada bluegrass
Canada thistle
Cattails
Common milkweed
Cottonwood

Curled dock
Dandelions
Field bindweed
Foxtail barley
Hemp dogbane
Hoary cress

Japanese knotweed
Kentucky bluegrass
Perennial sow-thistle
Poison-ivy
Purple loosestrife
Quackgrass

Smooth brome grass
Toadflax
Wormwood
Yellow nutsedge

Brush

Alder
Birch
Cedar
Cherry

Douglas fir
Hemlock
Maple
Pine

Poplar
Raspberry
Rhododendron
Sheep laurel

Snowberry
Willow
Withrod

Annual Weed Control Prior to Crop Emergence or in Summerfallow

Formulations (active ingredient)	Rate per acre	Surfactant per acre	Weeds controlled	Weed stage
Glyphosate (356 – 360 g/L)	0.31 L	0.14 L	Green foxtail, lady's-thumb, stinkweed, volunteer barley, volunteer canola (non-glyphosate tolerant), volunteer wheat, wild mustard, wild oats.	Up to 8 cm in height
Glyphosate (450 g/L)	0.24 L			
Glyphosate (480 g/L)	0.23 L			
Glyphosate (500 g/L)	0.21 L			
Glyphosate (540 g/L)	0.20 L			
Glyphosate (356 – 360 g/L)	0.41 L	0.14 L	All weeds listed above plus suppression of foxtail barley, flaxweed and kochia.	8-15 cm in height
Glyphosate (450 g/L)	0.32 L			
Glyphosate (480 g/L)	0.30 L			
Glyphosate (500 g/L)	0.28 L			
Glyphosate (540 g/L)	0.27 L			
Glyphosate (356 – 360 g/L)	0.51 – 0.77 L	Surfactant is not required	All weeds listed above plus downy brome, giant foxtail, Persian dandel, Canada fleabane, common ragweed, flaxweed, hemp-nettle, lamb's-quarters.	Weeds up to 15 cm in height. For narrow-leaved hawk's-beard 8-15 cm or wild buckwheat (3-4 leaf stage) use high rate.
Glyphosate (450 g/L)	0.41 – 0.61 L			
Glyphosate (480 g/L)	0.38 – 0.57 L			
Glyphosate (500 g/L)	0.36 – 0.57 L			
Glyphosate (540 g/L)	0.34 – 0.52 L			
Glyphosate (356 – 360 g/L)	0.91 L	Surfactant is not required	All weeds listed above plus annual sow thistle, bluegrass, crabgrass, kochia, prickly lettuce, shepherd's purse, and narrow-leaved vetch.	Up to 15 cm in height
Glyphosate (450 g/L)	0.73 L			
Glyphosate (480 g/L)	0.68 L			
Glyphosate (500 g/L)	0.65 L			
Glyphosate (540 g/L)	0.61 L			
Glyphosate (356 – 360 g/L)	1.42 L	Surfactant is not required	All annual grasses and broadleaved weeds listed above.	Greater than 15 cm in height
Glyphosate (450 g/L)	1.13 L			
Glyphosate (480 g/L)	1.07 L			
Glyphosate (500 g/L)	1.0 L			
Glyphosate (540 g/L)	0.94 L			

Tank Mixtures in Minimum and Zero Tillage Systems Cropping Systems – Prior to seeding

Not all glyphosate products are registered for all tank mixes below. Refer to individual glyphosate for registered tank mixes, glyphosate rates and registered crop species labels.

Spring wheat, winter wheat, barley and rye:

- Glyphosate + 2,4-D (0.23 – 0.34 L/acre) for broad-spectrum weed control, including control of volunteer Roundup Ready canola (up to 4-leaf stage)
- Glyphosate + 2,4-D (0.45 – 0.68 L/acre) for broad-spectrum weed control, including control of volunteer Roundup Ready canola (up to 6-leaf stage)
- Glyphosate + Buctril M (0.2 – 0.4 L), Logic M (0.25 – 0.5 L/acre) for broad-spectrum weed control, including control of volunteer Roundup Ready canola (up to 4-leaf stage)
- Glyphosate + Banvel II (0.12 L) for broad-spectrum weed control, excluding volunteer glyphosate tolerant canola
- Glyphosate + Express TNG (4 grams/acre) + Agral 90 (0.35% v/v) for broad-spectrum weed control. This tank mixture will not control glyphosate tolerant canola
- Glyphosate + Pardner (0.51 L/acre), Brotex (0.6 L/acre); for broad-spectrum weed control

Field corn, sweet corn and flax:

- Glyphosate + MCPA (0.28 L/acre) for broad-spectrum weed control, including control of volunteer Roundup Ready canola (up to 4-leaf stage)
- Glyphosate + Buctril M (0.2 – 0.4 L/acre), Logic M (0.25 – 0.5 L/acre) for broad-spectrum weed control, including control of volunteer Roundup Ready canola (up to 4-leaf stage)

Glyphosate (cont'd)**Field corn only:**

- Glyphosate + Banvel II (0.12 L) for broad-spectrum weed control, excluding volunteer glyphosate tolerant canola

Field peas, lentils, and chickpeas:

- Glyphosate + MCPA amine (0.2 – 0.28 L/acre) for broad-spectrum weed control, including glyphosate tolerant canola. Note: use only amine formulations prior to seeding peas, lentils and chickpeas.

Canaryseed and seedling forage grasses (bromegrass, crested wheatgrass, intermediate wheatgrass, slender wheatgrass, tall wheatgrass, Russian wildrye, timothy, orchard grass, creeping red fescue, meadow fescue, meadow foxtail, tall fescue, meadow bromegrass, streambank wheatgrass, and reed canarygrass:

- Glyphosate + Buctril M (0.2 – 0.4 L), Logic M (0.25 – 0.5 L/acre) for broad-spectrum weed control, including control of volunteer Roundup Ready canola (up to 4-leaf stage)

Tank Mixtures in Minimum and Zero Tillage Systems Cropping Systems – Chem fallow

- Glyphosate + 2,4-D (0.5 L/acre)
- Glyphosate + Banvel II (0.12 L/acre)
- Glyphosate + Express TNG (4 grams/acre)
- Glyphosate + Pardner (0.51 L/acre), Brotex (0.6 L/acre)

Quackgrass Control Prior to Seeding or after Harvest in Annual and Forage Cropping Systems

Apply to actively growing quackgrass. Reduced control may result if rhizomes become dormant. This may occur when soil fertility is poor or land has not been tilled for several years.

Application on forages should be followed by tillage and should be made when good growing conditions exist.

	Formulation (active ingredient)	Rate per acre	Weed stage	Remarks
Quackgrass control: season long control on light to moderate infestation	Glyphosate (356 – 360 g/L)	1.0 L	3 – 4 green leaves. On fall tilled ground, delay the application until majority of quackgrass has 4 – 5 leaves.	Allow 3 or more days after treatment before tillage. Fall treatment should be applied 3 – 4 weeks after swathing to actively growing quackgrass. Do not apply after first damaging frost in the fall. Frost of – 5 °C is usually tolerated by new shoots. Frost damage is evident by drying of new shoots shortly after frost.
	Glyphosate (450 g/L)	0.81 L		
	Glyphosate (480 g/L)	0.76 L		
	Glyphosate (500 g/L)	0.73 L		
	Glyphosate (540 g/L)	0.67 L		
Quackgrass control: heavy infestations or sod bound quackgrass	Glyphosate (356 – 360 g/L)	1.0 – 2.8 L	3 – 4 green leaves or more.	Use higher rate for sod bound quackgrass (left undisturbed for at least 2 years). Allow 3 or more days after treatment before tillage. Fall treatment should be applied 3 – 4 weeks after swathing to actively growing quackgrass. Do not apply after first damaging frost in the fall. Frost of – 5 °C is usually tolerated by new shoots.
	Glyphosate (450 g/L)	0.81 – 2.43 L		
	Glyphosate (480 g/L)	0.76 – 2.28 L		
	Glyphosate (500 g/L)	0.71 – 2.13		
	Glyphosate (540 g/L)	0.67 – 2.01		

Canada thistle control: Summerfallow and Post harvest

	Formulation (active ingredient)	Rate per acre	Weed stage	Remarks
Control of Canada thistle at the rosette stage (summerfallow)	Glyphosate (356 – 360 g/L)	1.0 L	Rosettes at least 15 cm in diameter	Conduct summerfallow tillage as usual and perform the last tillage operation between July 15 and August 1. Allow thistle to re-grow for a minimum of 5 weeks until they are 15 cm in diameter and majority of them are in a rosette stage. Allow 10 or more days after treatment before tillage. Treatment after a mild frost is possible provided leaves are green and plants are actively growing.
	Glyphosate (450 g/L)	0.81 L		
	Glyphosate (480 g/L)	0.76 L		
	Glyphosate (500 g/L)	0.73 L		
	Glyphosate (540 g/L)	0.67 L		

Glyphosate (cont'd)

	Formulation (active ingredient)	Rate per acre	Weed stage	Remarks
Control of Canada thistle: post-harvest stubble treatment	Glyphosate (356 – 360 g/L)	1.8 – 2.8 L	Bud stage or beyond	Allow 20 to 25 cm of new growth before application. Thistles must be sprayed at least 2 weeks prior to killing frost. Straw should be removed or evenly spread to allow for proper regrowth and spray coverage. Heavy frost prior to treatment may decrease control. Allow 5 or more days after treatment before tillage.
	Glyphosate (450 g/L)	1.62 – 2.3 L		
	Glyphosate (480 g/L)	1.44 – 2.13 L		
	Glyphosate (500 g/L)	1.38 – 2.02 L		
	Glyphosate (540 g/L)	1.28 – 1.89 L		

Tank Mixtures: Canada thistle control

- Glyphosate + Banvel II (0.12 L/acre)

Dandelion Control: Prior to seeding or after harvest

For best results, apply up to and including dandelion bloom.

Formulation (active ingredient)	Dandelion stage of growth.		Remarks
	Less than 15 cm rosettes	Greater than 15 cm rosettes	
Glyphosate (356 – 360 g/L)	1.0 L/acre	1.5 – 2.0 L/acre	Allow 3 or more days after treatment before tillage for all rates. Use the higher rate when infestations are heavy.
Glyphosate (450 g/L)	0.8 L/acre	1.21 – 1.61 L/acre	
Glyphosate (480 g/L)	0.76 L/acre	1.13 – 1.5 L/acre	
Glyphosate (500 g/L)	0.73 L/acre	1.09 – 1.46 L/acre	
Glyphosate (540 g/L)	0.67 L/acre	1.0 – 1.34 L/acre	

Alfalfa Control (Fall Treatment)

Formulation (active ingredient)	Rate per acre	Staging	Remarks
Glyphosate (356 – 360 g/L)	1.5 – 2.0 L	Early bud to full bloom (fall application only)	Use high rate when alfalfa populations are high or when grass infestation is heavy. Allow at least 5 days before tillage. Apply in 23 – 135 L/acre water.
Glyphosate (480 g/L)	1.13 – 1.52 L		
Glyphosate (500 g/L)	1.09 – 1.46 L		
Glyphosate (540 g/L)	1.0 – 1.33 L		

Tank mixtures for alfalfa control (fall and spring)

The addition of 2,4-D may improve alfalfa control in situations where control may be more difficult to obtain, such as in minimum tillage systems where populations are heavy, and with spring applications.

Tank mixture name	Rate per acre	Remarks
Glyphosate (356 – 360 g/L) + 2,4-D	Glyphosate: 1.0 – 2.0 L + 2,4-D: 0.49 – 0.97 L	For spring applications, use only the low rate of 2,4-D (i.e., 0.49 L/acre) and recommended rate of glyphosate. Only cereal crops not underseeded to legumes may be planted following spring applications of this tank mix, and a 14-day interval between application and planting is required.
Glyphosate (450 g/L) + 2,4-D	Glyphosate: 0.81 – 1.61 L + 2,4-D: 0.49 – 0.97 L	
Glyphosate (480 g/L) + 2,4-D	Glyphosate: 0.76 – 1.52 L + 2,4-D: 0.49 – 0.97 L	
Glyphosate (500 g/L) + 2,4-D	Glyphosate: 0.73 – 1.46 L + 2,4-D: 0.49 – 0.97 L	
Glyphosate (540 g/L) + 2,4-D	Glyphosate: 0.67 – 1.35 L + 2,4-D: 0.49 – 0.97 L	

Spot treatment (in-crop) of perennial weeds in wheat, oat, barley, corn, soybean forage legumes and forage grasses: Glyphosate may be applied for the control of Canada thistle, quackgrass and other perennial weeds (absinthe, blue grass spp., smooth brome grass, cattail, curled dock, field bindweed (bloom stage or beyond), hemp dogbane, hoary cress, poison ivy, purple loosestrife, perennial sow-thistle, and yellow nutsedge in forage crops, barley, wheat, oats, soybeans and legumes, including seed production. Treatments may be made up to heading of small grain, initial pod set on soybeans and legumes, silking of corn, and emergence of seed heads. The crop in the treated area will be killed. Avoid drift beyond the treated area. Application can be made using a boom sprayer, knapsack, or high volume equipment. Applications should be made using the same rates and at the same growth stages as listed in the quackgrass, Canada thistle and other perennial weed control tables.

Glyphosate (cont'd)

Other Perennial Weed control in Summerfallow, Shelterbelts and Post-harvest:

Weeds controlled	Formulation (active ingredient)	Rate per acre	Weed stage	Remarks
Common milkweed	Glyphosate (356 – 360 g/L)	4.9 L	Bud to full bloom	Allow 7 or more days after treatment before tillage. Reduced control may occur after full bloom. Milkweed may not all be in the correct stage, therefore, repeat treatments may be required
	Glyphosate (450 g/L)	3.9 L		
	Glyphosate (480 g/L)	3.64 L		
	Glyphosate (500 g/L)	3.47 L		
	Glyphosate (540 g/L)	3.24 L		
Field bindweed	Glyphosate (356 – 360 g/L)	2.8 – 4.8 L	Full bloom or beyond	Allow 7 or more days after treatment before tillage.
	Glyphosate (450 g/L)	2.27 – 3.88 L		
	Glyphosate (480 g/L)	2.12 – 3.64 L		
	Glyphosate (500 g/L)	2.02 – 3.48 L		
	Glyphosate (540 g/L)	1.88 – 3.21 L		
Foxtail barley	Glyphosate (356 – 360 g/L)	1.0 – 2.0 L	Seedling to heading	Allow a minimum of 1 day after treatment before tillage or seeding. Use higher rates for larger, more established plants, heavy infestations or if plants are stressed.
	Glyphosate (450 g/L)	0.81 – 1.62 L		
	Glyphosate (480 g/L)	0.76 – 1.5 L		
	Glyphosate (540 g/L)	0.67 – 1.34 L		
Toadflax rosette stage (summerfallow)	Glyphosate (356 – 360 g/L)	1.0 L	Rosettes at least 15 cm tall or across.	Allow 7 or more days after treatment before tillage in summerfallow.
	Glyphosate (450 g/L)	0.81 L		
	Glyphosate (480 g/L)	0.76 L		
	Glyphosate (540 g/L)	0.67 L		
Alfalfa	Glyphosate (356 – 360 g/L)	1.5 – 2.0 L/acre	Early bud to full bloom stage. Fall applications only.	Allow 5 or more days after treatment before tillage. Use the higher rates when alfalfa populations are high or when heavy grass infestations are also present.
	Glyphosate (480 g/L)	1.13 – 1.52 L/acre		
	Glyphosate (500 g/L)	1.09 – 1.46 L		
	Glyphosate (540 g/L)	1.0 – 1.34 L		

Pre-harvest Perennial Weed Control

Crop: Wheat, barley (including malting barley*), oats*, canola (rapeseed), dry beans, flax (including solin), lentils, peas, soybeans and forages.

Weeds Controlled: Quackgrass, Canada thistle, common milkweed, toadflax, dandelion, perennial sow-thistle (season long)

Rate:

Formulation (active ingredient)	Crops		
	Wheat, barley (including malting barley*), oats*, canola (rapeseed), dry beans, flax (including solin), lentils, peas, soybeans	Chickpeas**, lupin**, fababeans**	Forages
Glyphosate (356 – 360 g/L)	1 L/acre	Not registered	1 – 2 L/acre
Glyphosate (450 g/L)	0.8 L/acre	Not registered	0.8 – 1.6 L/acre
Glyphosate (480 g/L)	0.76 L/acre	Not registered	0.76 – 1.52 L/acre
Glyphosate (500 g/L)	0.73 L/acre	Not registered	0.73 – 1.46 L/acre
Glyphosate (540 g/L)	0.67 L/acre	0.67 L/acre	0.67 – 1.34 L/acre

Cautions: Do not apply to any crops if grown for seed.

*Barley grown for malt and tame oat grown for milling are registered for the pre-harvest application. However, growers should contact malt barley and milling oat buyers prior to application to confirm acceptance of glyphosate treated grain

** These crops are registered with R/T 540, Roundup Transorb HC, Roundup WeatherMax and Roundup Ultra 2 only under *User Requested Minor Use Label Expansion program*, the manufacturer assumes no responsibility with respect to performance and/or crop tolerance claims for herbicide performance.

How to Apply

Ground (All products). Aerial: Do not apply by air, except Glyphos, Shooter Plus, Factor 540, Roundup Transorb II, Roundup WeatherMax, Roundup Ultra 2.

Crop Staging: Apply when average seed moisture is at or below 30%. Accurate measurement of seed moisture must be made before application. The following chart lists visual symptoms that can be used as guidelines to when 30% grain moisture has been reached.

Crop*	Percent seed moisture	Visual symptoms
Wheat, barley, oat	Less than 30	Hard dough stage – a thumbnail impression remains on seed.
Canola (including glyphosate tolerant varieties)	Less than 30	Pods are green to yellow; most seeds are yellow to brown.
Flax (including low-linoleic acid varieties)		Majority (75%-80%) of bolls are brown.
Forage	Not applicable	Forage 3 to 7 days prior to the last cut before rotation or forage renovation. Do not apply to forage stands that are to be maintained.
Peas	Less than 30	Majority (75%-80%) of pods are brown.
Lentils	Less than 30	Lowermost pods (bottom 15%) are brown and seeds rattle.
Dry beans	Less than 30	Stems are green to brown in colour; pods are mature (yellow to brown in colour); 80%-90% leaf drop (original leaves).
Soybeans (including glyphosate tolerant varieties)	Less than 30	Stems are green to brown in colour; pod tissue is dry and brown in appearance; 80%-90% leaf drop.
Chickpea	Less than 30	Stems are green to brown in colour; pods are mature (yellow to brown in colour); 80%-90% leaf drop (original leaves)
Lupin		
Faba beans		

* Not all glyphosate products are registered for pre-harvest application on all crops species listed above. Refer to individual crop labels for registered uses and crop species.

Weeds Controlled and staging

Quackgrass (4-5 green leaves), Canada thistle (at bud stage or beyond), common milkweed (bud to full bloom), toadflax (bud to full bloom), dandelions (rosette to full bloom), season-long control of perennial sow-thistle (at or beyond the bud stage), and most of the annual weeds which are green at the time of pre-harvest application.

Harvest Management Benefits

This treatment may also provide harvest management benefits by drying down crop and vegetative crop growth. Apply only during the period 7-14 days before harvest to ensure best weed control and to maximize harvest management benefits. Earlier application may reduce crop yield and/or quality, and may lead to excess glyphosate residues in the crop. Extremely cool wet and cloudy weather conditions between time of application and the anticipated harvest date may slow down activity of this product, thereby delaying crop dry down and harvest date.

Environmental precautions

Over-spray or drift to important wildlife habitats such as bodies of water, wetlands (e.g., sloughs), shelterbelts, woodlots and other cover on the edges of fields frequented by wildlife, should be avoided. **Ground Application:** Leave a 15-meter buffer zone between the last spray swath and the edge of any of these habitats. Do not expose or contaminate any body of water or non-target vegetation by direct application, spray drift, or when cleaning and rinsing spray equipment. **Aerial applications:** maintain a 25 meter buffer zone from water and wetland areas, and 55 m buffer from shelterbelts, woodlots, and other cover on the edge of treated fields.

Glyphosate (cont'd)**For Use in Glyphosate Tolerant Crops****Glyphosate Tolerant canola**

Crop: Canola variety with Roundup ready gene. Always use pedigree (certified) canola seed. Canola which is not designated as glyphosate tolerant will be damaged or destroyed by this treatment. Note: Not all glyphosate products are registered.

Crop Stage: Up to and including 6-leaf stage of glyphosate tolerant canola. Temporary yellowing may occur if applied at the 4 to 6 leaf stage of the crop.

With: Ground application only.

Water Volume: 40 – 90 L/acre.

Grazing and cropping restrictions: All portions of the treated crop may be fed to livestock.

Formulation (active ingredient)	Rate per acre	Weeds controlled
Single Application		
Glyphosate (356 – 360 g/L)	0.33 – 0.50 L	Annual grasses: barnyard grass, green foxtail, volunteer barley, volunteer wheat, wild oats. Annual broadleaves: Stinkweed, redroot pigweed, wild mustard, Russian thistle, lamb's-quarters, non-glyphosate tolerant volunteer canola (rapeseed), hemp-nettle, lady's-thumb, kochia, chickweed, corn spurry, wild tomato, cleavers, wild buckwheat, shepherd's purse, cow cockle*, night-flowering catchfly*, smartweed*, stork's-bill, flixweed, narrow-leaved hawk's beard, round-leaved mallow.
Glyphosate (450 g/L)	0.27 – 0.40 L	
Glyphosate (480 g/L)	0.25 – 0.38 L	
Glyphosate (500 g/L)	0.24 – 0.57 L	
Glyphosate (540 g/L)	0.22 – 0.33 L	
Glyphosate (356 – 360 g/L)	0.50 L	Perennial weed suppression: Canada thistle, dandelion, perennial sow-thistle, and season-long control of quackgrass.
Glyphosate (450 g/L)	0.40 L	
Glyphosate (480 g/L)	0.38 L	
Glyphosate (500 g/L)	0.36 L	
Glyphosate (540 g/L)	0.33 L	
Double application (first application as above)		
Glyphosate (356 – 360 g/L)	0.50 L	Additional flushes of weeds listed above plus round-leaved mallow, Canada thistle, foxtail barley, dandelion, perennial sow thistle, quack grass (season-long control).
Glyphosate (450 g/L)	0.40 L	
Glyphosate (480 g/L)	0.38 L	
Glyphosate (500 g/L)	0.36 L	
Glyphosate (540 g/L)	0.33 L	
Single Application for Perennial Weed Control		
Glyphosate (356 – 360 g/L)	0.75 L	All the weeds in single application listed above plus season-long control of Canada thistle and perennial sow-thistle.
Glyphosate (450 g/L)	0.60 L	
Glyphosate (480 g/L)	0.56 L	
Glyphosate (500 g/L)	0.55 L	
Glyphosate (540 g/L)	0.51 L	

* The lower rate can be used for control of shepherd's purse, cow cockle and night-flowering catchfly at the 1 – 3 leaf stage of the crop or for control of smartweed at the 4 – 6 leaf stage.

Note: A maximum of 1.0 L/acre of Glyphos, Sharpshooter Plus, and Touchdown iQ, 0.76 L/acre of Maverick III and Vantage Plus and 0.67 L/acre of Factor 540, Roundup Transorb HC, Roundup Weather Max, Roundup Ultra 2, R/T 540 per season is allowed in glyphosate tolerant Canola.

Glyphosate (cont'd)

Tank Mixtures in Glyphosate Tolerant Canola

For season long control of top growth of Canada thistle and control of wild buckwheat in glyphosate tolerant canola.

Tank mixture name	Rate per acre	Remarks
Glyphosate (356 – 360 g/L) + Lontrel 360	Glyphosate: 0.5 L + Lontrel: 113 mL	Apply in 40 L of water per acre. Apply when canola is in the 2 – 6 leaf stage.
Glyphosate (450 g/L) + Lontrel 360	Glyphosate: 0.4 L + Lontrel: 113 mL	
Glyphosate (480 g/L) + Lontrel 360	Glyphosate: 0.38 L + Lontrel: 113 mL	
Glyphosate (500 g/L) + Lontrel 360	Glyphosate: 0.36 – 1.46 L/acre + Lontrel: 113 mL	
Glyphosate (540 g/L) + Lontrel 360	Glyphosate: 0.33 – 1.35 L/acre + Lontrel: 113 mL	

Glyphosate tolerant corn

Crop: Corn with Roundup ready gene. Always use pedigreed (certified) corn seed. Corn, which is not designated as glyphosate tolerant, will be damaged or destroyed by this treatment.

Crop Stage: Up to and including 8-leaf stage of glyphosate tolerant corn.

How to Apply: Ground application only. **Do not apply by air.**

Water Volume: 40 – 90 L/acre.

Formulation (active ingredient)	Rate per acre	Weeds controlled
Glyphosate (356 – 360 g/L)	1.0 L	Annual grasses: barnyard grass, green foxtail, volunteer barley, volunteer wheat, wild oat. Annual broadleaves: chickweed, cleavers, corn spurry, cow cockle, flixweed, hemp-nettle, kochia, lady's-thumb, lamb's-quarters, narrow-leaved hawk'-beard, night-flowering catchfly, redroot pigweed, round leaved mallow*, Russian thistle, shepherd's-purse, smartweed, stinkweed, stork's-bill, volunteer canola (except glyphosate tolerant varieties), wild buckwheat, wild mustard, wild tomato.
Glyphosate (450 g/L)	0.76 L	
Glyphosate (480 g/L)	0.73 L	
Glyphosate (500 g/L)	0.80 L	
Glyphosate (540 g/L)	0.67 L	
A second (sequential) application		
Glyphosate (356 – 360 g/L)	1.0 L	Late flushes of heavy infestations of the above weeds plus control of: common milkweed, field bindweed, round-leaved mallow, yellow nutsedge.
Glyphosate (450 g/L)	0.80 L	
Glyphosate (480 g/L)	0.76 L	
Glyphosate (500 g/L)	0.73 L	
Glyphosate (540 g/L)	0.67 L	

Note: Weeds will be more easily controlled and early crop competition avoided with applications made when the weeds are small. Control of weeds greater than 25 cm in height will be inconsistent, although some weeds may be controlled.

Weed Control in Non-cropland Areas

Weed	Formulation (active ingredient)	Rate per acre	Hand held high volume application % solution	Remarks
Annual grasses and broadleaves	Glyphosate (356 – 360 g/L)	0.91 – 1.21 L	0.67 %	Apply to actively growing weeds. Water volume: 20 – 40 L/acre.
	Glyphosate (480 g/L)	0.68 – 1.1 L		
	Glyphosate (540 g/L)	0.6 – 0.94 L		
Quackgrass	Glyphosate (356 – 360 g/L)	1.91 – 2.82 L	1.34%	20 – 120 L/acre of water volume. Add 0.5% v/v of a recommended surfactant when using water volumes greater than 60 L/acre. Higher rate for long term control and for heavy infestations.
	Glyphosate (480 g/L)	1.44 – 2.12 L		
	Glyphosate (540 g/L)	1.28 – 1.84 L		

Glyphosate (cont'd)

Weed	Formulation (active ingredient)	Rate per acre	Hand held high volume application % solution	Remarks
Canada thistle (bud stage)	Glyphosate (356 – 360 g/L)	1.91 – 2.82 L	1.34 %	20 – 120 L/acre of water volume. Add 0.5% v/v of a recommended surfactant when using water volumes greater than 60 L/acre. Higher rate for long term control and for heavy infestations.
	Glyphosate (480 g/L)	1.44 – 2.12 L		
	Glyphosate (540 g/L)	1.28 – 1.84 L		
Purple loosestrife	Glyphosate (356 – 360 g/L)	2.42 L	0.67 – 1.34%. Use 22% solution for wiper application	
	Credit 45	1.94 L		
	Glyphosate (480 g/L)	1.81 L		
	Glyphosate (540 g/L)	1.61 L		
Other perennials	Glyphosate (356 – 360 g/L)	2.82 – 4.84 L	1.34 %	Water Volume: 40 – 120 L/acre. Add 0.5% v/v of a recommended surfactant when using water volumes greater than 60 L/acre. Higher rate for long term control and for heavy infestations.
	Glyphosate (480 g/L)	2.12 – 3.63 L		
	Glyphosate (540 g/L)	1.89 – 3.23 L		
Brush and trees: birch, cherry, poplar, western snow berry, willow	Glyphosate (356 – 360 g/L)	1.21 – 2.42 L	0.67 – 1.34 %	Water volume: 40 – 120 L/acre. Timing: Summer through early fall
	Credit 45	0.97 – 1.94 L		
	Glyphosate (480 g/L)	0.91 – 1.81 L		
	Glyphosate (540 g/L)	0.8 – 1.6 L		
Alder, maple, raspberry, salmonberry	Glyphosate (356 – 360 g/L)	2.42 L	1.34 %	Water volume: 40 – 120 L/acre. Timing: Late summer through early fall
	Credit 45	1.94 L		
	Glyphosate (480 g/L)	1.81 L		
	Glyphosate (540 g/L)	1.61 L		
Turf renovation	Glyphosate (356 – 360 g/L)	1.0 – 4.85 L	0.67 – 1.34 %	Water volume: 40 – 120 L/acre. Use higher end of the rate range for perennials
	Credit 45	0.8 – 3.9 L		
	Glyphosate (480 g/L)	0.76 – 3.64 L		
	Glyphosate (540 g/L)	0.67 – 3.2 L		

Tank Mixtures for Non-crop and Industrial Areas – Residual Control:

Tank mixture name	Rate per acre	Remarks
Glyphosate (356 – 360 g/L) + Simazine	Glyphosate: 1.0 – 4.85 L Simazine: 1.61 – 3.63 L	The simazine component of this tank mixture will provide season long control of most germinating broadleaf weeds and grasses. Water Volume: 80 – 160 L/acre. Do not apply to coarse, sandy or gravelly soil. One application per year.
Glyphosate (480 g/L) + Simazine	Glyphosate: 0.75 – 3.63 L Simazine: 1.61 – 3.63 L	
Glyphosate (540 g/L) + Simazine	Glyphosate: 0.67 – 3.23 L Simazine: 1.61 – 3.63 L	

Additional Application Information

Water Volume: Handgun (high water volume): 80 – 120 L/acre. Boom: 23 – 45 L per acre in most situations; use of the lower volume may improve control when hard water (Ca or Mg) or iron (Fe) ions are present.

Chemical fallow: 20 – 40 L/acre.

Nozzles and Pressure: Use 200 to 275 kPa when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage and a minimum of fine droplets that are prone to drift.

Glyphosate (cont'd)

Application Tips

Tillage or mowing prior to application will reduce effectiveness on perennial weeds. Minimum days to wait before tillage after application: annual weeds 1 day; spring and fall quackgrass: 3 days; Canada thistle bud stage: 5 days; fall rosette stage: 7 – 10 days; field bindweed, milkweed and other perennials: 7 days. Best results are obtained when temperature are near 20° C and when weeds are actively growing. Control will be reduced if foliage is heavily covered with dust. Hard water or water containing calcium (Ca), Magnesium (Mg) and iron (Fe) ions will reduce the activity of glyphosate. Dirty water or water with suspended soil or organic matter will reduce control.

How it works

A non-selective, systemic herbicide that moves from the foliage into roots and kills the entire plant.

Expected results

Wilting and yellowing of annual occurs within 2-4 days; perennial requires 7 – 10 days. Complete browning of above ground growth and deterioration of roots occurs. Cool cloudy conditions may slow activity.

Effect of Rainfall: Heavy rainfall immediately after application may wash the chemical off the foliage and a repeat treatment may be required. Do not apply if rainfall is forecast for the time of application. **Note. Roundup Transorb, Roundup WeatherMax, Roundup Ultra 2, and R/T 540:** Rainfall occurring within 60 minutes of treatment may result in reduced weed control.

Movement in the soil: Negligible leaching.

Grazing restrictions: Do not graze or harvest treated areas until plants have turned brown and started to deteriorate.

Re-cropping Intervals: No restrictions.

Environmental Hazards

Avoid direct application to any body of water populated with fish or used for domestic purposes. Do not use in areas where adverse impact on domestic water or aquatic species is likely. Do not contaminate water by disposal of waste or cleaning of equipment. Avoid all drift or contact with vegetation for which treatment is not intended as damage or destruction may occur. Overspray or drift to important wildlife habitats such as bodies of water, wetlands (e.g., sloughs), shelterbelts, woodlots and other cover on the edges of fields frequented by wildlife, should be avoided. Observe following buffer zone guidelines: **Ground Applications:** Leave a 15 meter buffer zone between the last spray swath and the edge of the spray boom to non-target areas to minimize drift damage.

Toxicity

Very low acute mammalian toxicity. Acute oral LD₅₀ = 4,320 mg/kg. Eye irritant, non-toxic to bees, birds and fish.

Storage

Heated storage is not required. May be stored below 0° C.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.

Gramoxone (paraquat)**Group 22**

Manufacturer: Syngenta Crop Protection Canada Inc.



Danger Poison

- 1. Formulations:** Solution; 200 g/L (PCP# 8661); 1, 4 x 5 L pack.
- 2. Registered Mixes:** Lorox, Sencor and 2,4-D.

Chemical mowing of non-crop areas: May be tank mixed with certain soil sterilants where immediate top kill and long-term sterilization are required.

- 3. Crops:** Asparagus, non-crop areas, potatoes, shelterbelts, stale seedbed (field crops, vegetables), sugar beets.

Gramoxone (cont'd)

4. Weeds Controlled: All top growth. Generally kills annuals in 1 application. Repeat applications may be needed on perennials.

5. Weeds Suppressed: Most perennial weeds.

6. When Used:

Crop stage: Prior to crop emergence but soon after weeds emerge.

Potatoes: Apply up to ground crack (potatoe tops about to emerge) only for Netted Gem and Cherokee. Other varieties apply up until the first potato tops are 5 - 8 cm. Do not apply to emerged potato foliage in the evening, or to early potatoes when potatoes are under moisture stress due to extremely dry soil conditions.

Stale seedbed: Apply up to 3 days before crop emergence and no later.

7. How to Apply:

With: Ground equipment only. Do not use mist blowers.

Rate:

Chemical mowing: 1.1 L in 220 - 445 L/ac of water.

Non-crop areas: 2.2 - 4.5 L in 220 - 445 L/ac of water.

Potatoes: Quackgrass, annual grasses and broadleaf weeds: 1 - 1.75 L in 120 - 220 L/ac of water; emerged seedlings thereof: only 610 mL in 120 - 220 L/ac of water. **Note:** Application to exposed or emerged potato foliage will cause temporary injury and chlorosis. Use of poor or diseased seed and cut seed with 1 eye will make potatoes more susceptible to injury by post-emergence sprays. Will not control weeds that germinate after treatment.

Shelterbelts: 2.2 L in 445 L of water/ac or 75 mL in 10 L of water/100 m². 550 mL of this mixture will treat an area 1.75 m diameter around a tree. Keep chemical off the tree foliage.

Stale seedbed technique (vegetables, field crops): Beans (all types), beets, carrots, cole crops, corn, cucumbers, onions, peas, potatoes, soybeans, turnips. Prepare a seedbed at least 2 - 4 weeks before seeding to stimulate weed growth. Seed with minimum soil disturbance. Burn-off of emerged weeds: 1.1 - 2.2 L in 120 - 445 L of water/ac before or after seeding. Weeds above 5 cm tall: 2.2 L/ac.

Water volume: 120 - 445 L/ac. Thoroughly wet all foliage. For dense weed growth, use the greater volume of water.

Pressure: 300 kPa.

Nozzles: Flat fan recommended.

Incorporation: Not applicable.

8. Application Tips: Use only clean water to avoid reduction in effectiveness. Use high volume, low pressure type spraying equipment to thoroughly cover foliage. Special equipment is necessary to shield some row crops from spray. Applications on cloudy days or just prior to or during periods of darkness will generally increase the treatment effectiveness. Wash equipment thoroughly after spraying - use a wetting agent (Agral 90 at 60 mL/100 L of water), flush and spray out, then thoroughly rinse with clean water. Fill with clean water and leave overnight, then spray out.

9. How it Works: Gramoxone is a contact type herbicide; therefore, good spray coverage is essential. It is absorbed by all leaf and stem surfaces and is non-systemic. It interferes with photosynthesis.

10. Expected Results: Provides immediate, fast and virtually complete annual weed kill from 1 application. Repeat applications may be necessary for perennial weeds. Yellowing occurs within a few hours and desiccation of the plant continues rapidly until death.

11. Effects of Rainfall: Rain prior to spray solution drying on plant or muddy water will reduce effectiveness of the chemical. Once spray solution has dried on plant tissue, rain will not reduce effectiveness.

12. Movement in Soil: Binds to the soil and becomes biologically unavailable. No residual effect.

Gramoxone (cont'd)

13. Cropping Restrictions:**Succeeding crops:** No restriction.**Drift:** Prevent drift onto crops, ornamentals, lawns, grazing areas or other desirable areas.**Grazing restrictions:** Not applicable.**Crop use after hail:** No restriction.

- 14. Toxicity:** High acute mammalian toxicity. Acute oral LD₅₀ (rats) = paraquat ion 120 - 150 mg/kg. Symptoms of acute poisoning may occur. Intake can cause heart, liver and kidney damage and can be fatal. It can be absorbed through the skin.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Heated storage preferred. Will crystallize if frozen. Never transfer to other containers.
- 17. Resistance Management:** See page 41 for information on resistance management.

Grazon (picloram + 2,4-D)**Group 4**

Manufacturer: Dow AgroSciences Canada Inc.

- 1. Formulations:** Emulsifiable concentrate; 65 g picloram + 240g 2,4-D Amine/L (PCP# 26649); 2 x 10 L jug, 110 L.
- 2. Registered Mixes:** None.
- 3. Crops:** Permanent grass pastures and rangeland.
- 4. Weeds Controlled:** Seasonal control - 1.5 L/ac: Canada thistle, common yarrow, dandelion. Weed control - 2.8 L/ac: Burdock, Canada thistle, common ragweed, common yarrow, dandelion, fleabane, goldenrod, plantain, prickly lettuce, red clover, sweet clover, vetch, wild carrot.
- Tree Control:** Contact manufacturer for more information and recommendations.
- 5. Weeds Suppressed:** None.
- 6. When Used:**
- Crop stage:** Apply in spring or early summer.
- Weed stage:** After weeds have fully emerged and when weeds are growing rapidly.
- 7. How to Apply:**
- With:** Ground equipment or by air using a drift control system or agent.
- Rate:** Weed and tree control: 1.5 - 10.12 L/ac.
- Water volume:** 80 L/ac.
- Nozzles:** Apply with nozzles that produce coarse uniform droplets.
- Pressure:** Use pressures within nozzle manufacturer's recommended range.
- 8. Application Tips:** Apply in spring or early summer after weeds have fully emerged and when weeds are growing rapidly. Ensure that there is adequate coverage of target weeds. Broadleaf crops are extremely sensitive to Grazon, and care should be taken to prevent drift onto sensitive crops. Do not contaminate water used for irrigation or domestic purposes. Do not apply on soils that are very permeable (sandy loam to sand) through the entire profile and that have an underlying shallow aquifer.
- 9. How it Works:** Interferes with cell division, causing leaf cupping, stem distortion and eventual death of plant. Grazon is absorbed through leaves and roots.

Grazon (cont'd)

10. **Expected Results:** Perennial weeds show distorted stems and cupped leaves, which turn yellow and then brown. Usually native grass increases in abundance as a result of reduced competition. Poor results may be expected if weeds are not actively growing in late summer or due to drought or frost.
11. **Effects of Rainfall:** Heavy rainfall immediately after application may wash the chemical off the foliage, resulting in reduced weed control. Do not apply if rainfall is forecast for the time of application.
12. **Movement in Soil:** Picloram, one of the components of Grazon, is very soluble in water and moves with water in coarsely textured soils.
13. **Cropping Restrictions:** Legumes may not be established in a pasture for several years after a Grazon treatment. If legumes are essential in a pasture, do not use Grazon. Do not break up treated pasture and plant to sensitive broadleaf crops for at least 5 years after application of Grazon. Do not graze lactating dairy animals in treated area within 7 days after treatment. Withdraw meat animals from treated fields 3 days prior to slaughter. Do not harvest forage or cut hay within 30 days after application. Do not move cut forage or manure from treated areas to areas that may be seeded to a sensitive crop.
14. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD₅₀ (rats) = 2,598 mg/kg.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Store in a cool, dry place. Do not freeze. If freezing occurs, bring to room temperature and mix thoroughly.
17. **Resistance Management:** See page 41 for information on resistance management.

Harmony K *(clodinafop-propargyl + thifensulfuron-methyl + tribenuron-methyl + dicamba)*

Group 1,2,4

Manufacturer: E.I. duPont Canada Co.

1. Formulations:

1. **Refine SG:** Soluble granules; 33% thifensulfuron methyl + 16.7% tribenuron methyl (PCP# 28285); 480 g container.
2. **Horizon:** Emulsifiable concentrate; 240 g/L (PCP# 25854); 1 x 3.7 L + 2 x 6.4 L Score.
3. **Banvel II:** Solution; 480 g/L dicamba (PCP# 23957); 1 x 1.8 L.

2. Registered Mixes: None.

3. Crops: All spring wheat (including durum).

4. Weeds Controlled:

ball mustard	green foxtail	narrow-leaved hawk's-beard	volunteer canola (8.6)
chickweed (8.5)	green smartweed	redroot pigweed (8.4)	(excluding Clearfield)
common groundsel	hemp-nettle (8.4)	Russian thistle (7.9)	volunteer sunflower
corn spurry (8.8)	kochia (including	shepherd's-purse (8.2)	wild buckwheat (8.8)
cow cockle (8.7)	ALS resistant)	stinkweed (8.6)	wild mustard (8.6)
dandelion	lady's-thumb	tartary buckwheat (8.3)	wild oats
flixweed	lamb's-quarters (8.6)		

5. Weeds Suppressed: Canada thistle (7.1), cleavers (6.7), round-leaved mallow (6.4), scentless chamomile (6.9), sow thistle, stork's-bill (6.7), toadflax (less than 15 cm tall) (7.1).

6. When Used:

Crop stage: Apply post-emergence to crop from 2 - 5 leaf stage of wheat.

Safety information, see page 25

Weed stage: Green foxtail: 1 - 5 true leaves on the main stem prior to emergence of 3rd tiller, while actively growing. **Wild oats:** 1 - 6 true leaves on the main stem and prior to emergence of the 4th tiller. **Broadleaf weeds:** Apply to young, actively growing, broadleaf weeds before the canopy closes. Weeds emerging after treatment may not be controlled. Annual smartweed, green smartweed, lady's-thumb, ball mustard, corn spurry, cow cockle, flaxweed, hemp-nettle, common groundsel, lamb's-quarter, narrow-leaved hawk's-beard, redroot pigweed, Russian thistle, shepherd's-purse, stinkweed, tartary buckwheat, volunteer canola, wild mustard: less than 10 cm tall or across. **Chickweed:** 1 - 6 leaf stage. **Cleavers:** 1 - 3 whorl stage. **Wild buckwheat:** Cotyledons to 5 leaf stage. **Kochia:** 1 - 8 leaf stage.

Canada thistle, sow thistle: Apply when the majority of the thistles have emerged and are actively growing. For best top growth control, apply when thistles are larger than 15 cm tall before bud stage and before crop canopy prevents thorough coverage of the thistles. **Round-leaved mallow:** 2 - 6 leaf stage (10 - 12 cm in height). **Toadflax:** Less than 15 cm in height. A control program for this weed includes both frequent tillage and chemical application. **Dandelion:** Less than 15 cm rosette.

7. How to Apply:

With: Ground equipment only. Do not apply by air.

Rate: Horizon: 95 mL/ac, Refine SG: 12 g/ac, Banvel II: 60 mL/ac, Score 0.8% v/v of spray solution.

Water volume: 40 L/ac.

Pressure: 275 kPa.

Nozzles: Use flat fan nozzles. Use 50 mesh screens or larger. Use only metal or nylon filters.

Mixing instructions: Using mixing instructions "b" on page 12.

Sprayer cleanup: To avoid injury to susceptible crops, thoroughly clean sprayer immediately after spraying. Ammonia must be used to deactivate Harmony K when cleaning. Use cleanup method A on page 16.

8. **Application Tips:** Higher spray volumes are required for dense crop canopy and/or large weeds. Weeds should be less than 10 cm tall or across at application. Effectiveness of Harmony K may be reduced if it remains in the tank for more than 24 hours. Do not use flood type nozzles, controlled droplet application equipment, spray foils or hollow cone nozzles. Do not apply to crop stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result.
9. **How it Works:** Harmony K is absorbed by the foliage and rapidly translocated to the growing points. Inhibits cell elongation in broadleaf weeds. Thorough coverage of the plants is essential for consistent control.
10. **Expected Results:** Broadleaf weed growth stops immediately. Discolouration of dying weeds may be noticeable for 1 - 3 weeks after application, depending on growing conditions and weed species. Grassy weeds - depending on the species, growing conditions and crop competition - leaves and growing points turn yellow within 1 - 3 weeks after application. Further colour changes and loss of vigour will be observed followed by a browning, and complete control occurs 3 - 5 weeks after application. **Poor results may be expected if** there is improper mixing, timing or coverage, or when weeds are under drought stress.
11. **Effects of Rainfall:** Rainfall within 4 hours of application may lessen degree of weed control with Harmony K.
12. **Movement in Soil:** Harmony K moves little in the soil and disappears from the soil quickly.
13. **Cropping Restrictions:** Do not treat wheat underseeded to forages. Do not plant to any crop until 2 months after application. Do not exceed a total of 12 g/ac of Refine SG per crop year.
Grazing restrictions: Wheat may be grazed 7 days after the application of Harmony K.
Other restrictions: Pre-harvest interval is 60 days.
14. **Toxicity:** Acute oral LD₅₀ (rats) = 2,276 mg/kg; Acute dermal LD₅₀ (rats) = 4,000 mg/kg.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Store product in closed, original container in a cool, dry, well ventilated room.
17. **Resistance Management:** See page 41 for information on resistance management.

Harmony SG *(clodinafop-propargyl + thifensulfuron-methyl + tribenuron-methyl)*

Group 1,2

Manufacturer: E.I. duPont Canada Co.



Warning Poison

1. Formulations:

1. **Refine SG:** Soluble granules; 33.3% thifensulfuron methyl, 16.7% tribenuron methyl (PCP# 28285); 480 g/container.
2. **Horizon:** Emulsifiable concentrate; 240 g/L (PCP# 25854) + 2 x 6.4 L Score.

2. Registered Mixes:

Banvel II (44.5 mL/ac), spring wheat + MCPA Ester (250 - 340 mL/ac) for 500 g/L formulation.

3. Crops:

All types of durum wheat and spring wheat.

4. Weeds Controlled:

ball mustard	green smartweed	redroot pigweed (8.4)	volunteer canola (8.6)
chickweed (8.5)	hemp-nettle (8.4)	Russian thistle (7.9)	(excluding Clearfield)
common groundsel	kochia (7.8)*	shepherd's-purse (8.2)	volunteer sunflower
corn spurry (8.8)	lady's-thumb	stinkweed (8.6)	wild buckwheat (8.6)
cow cockle (8.7)	lamb's-quarters (8.6)	tartary buckwheat (8.3)	wild mustard (8.6)
flixweed	narrow-leaved		wild oats
green foxtail	hawk's-beard		

* **Note:** Prairie-wide surveys of kochia fields have found approximately 90% of kochia populations that are Group 2 herbicide resistant. Without testing to confirm, assume the kochia in your field is resistant and will not be controlled by this product alone.

5. Weeds Suppressed:

Canada thistle (7.1), cleavers (6.7), round-leaved mallow (6.4), scentless chamomile (6.9), sow thistle, stork's-bill (6.7), toadflax (less than 15 cm tall)(7.1).

6. When Used:

Crop stage: Apply post-emergence to crop from 2 to flag leaf stage in spring wheat.

Weed stage: Green foxtail: 1 - 5 true leaves on the main stem, prior to emergence of 3rd tiller, while actively growing. **Wild oats:** 1 - 6 true leaves on the main stem and prior to emergence of the 4th tiller.

Broadleaf weeds: Apply to young, actively growing broadleaf weeds before the canopy closes. Weeds emerging after treatment may not be controlled. Annual smart weed, green smart weed, lady's-thumb, ball mustard, corn spurry, cow cockle, flix weed, hemp-nettle, common groundsel, kochia, lamb's-quarters, narrow-leaved hawk's-beard, redroot pigweed, Russian thistle, shepherd's-purse, stinkweed, tartary buckwheat, volunteer canola, wild mustard: less than 10 cm tall or across. **Chickweed:** 1 - 6 leaf stage.

Cleavers: 1 - 3 whorl stage. **Wild buckwheat:** Coltyledon to 5 leaf stage.

Canada thistle, sow thistle: Apply when the majority of the thistles have emerged and are actively growing. For best top growth control, apply when thistles are larger than 15 cm tall before bud stage and before crop canopy prevents thorough coverage of the thistles. **Round-leaved mallow:** 2 - 6 leaf stage (10 - 12 cm in height). **Toadflax:** Less than 15 cm in height. A control program for this weed includes both frequent tillage and chemical application.

7. How to Apply:

With: Ground equipment only. Do not apply by air.

Rate: Horizon: 95 mL/ac, Refine SG: 12 g/ac, Score 0.8% v/v of spray solution.

Water volume: 40 L/ac.

Pressure: 275 kPa.

Nozzles: Use flat fan nozzles. Use 50 mesh screens. Use only metal or nylon filters.

Safety information, see page 25

Mixing instructions: Use mixing instructions "b" on page 12.

Sprayer cleanup: To avoid subsequent injury to crops other than wheat, spring barley or oats, immediately after spraying and prior to spraying other crops, thoroughly remove all traces of Refine SG herbicide from mixing and spray equipment using cleaning method A on page 16.

- 8. Application Tips:** Higher spray volumes are required for dense crop canopy and/or large weeds. Weeds should be less than 10 cm tall or across at application. Effectiveness of Harmony Total/Harmony SG may be reduced if it remains in the tank for more than 24 hours. Do not use flood type nozzles, controlled droplet application equipment, spray foils or hollow cone nozzles. Do not apply to crop stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result.
- 9. How it Works:** Harmony SG is absorbed by the foliage and rapidly translocated to the growing points. Inhibits cell elongation in broadleaf weeds. Thorough coverage of the plants is essential for consistent control.
- 10. Expected Results:** Broadleaf weed growth stops immediately. Discolouration of dying weeds may be noticeable for 1 - 3 weeks after application, depending on growing conditions and weed species. Grassy weeds – depending on the species, growing conditions and crop competition – leaves and growing points turn yellow within 1 - 3 weeks after application. Further colour changes and loss of vigor will be observed followed by a browning, and complete control occurs 3 - 5 weeks after application. **Poor results may be expected if** there is improper mixing, timing or coverage, or when weeds are under drought stress.
- 11. Effects of Rainfall:** Rainfall within 1 hour of application may reduce weed control with Harmony SG.
- 12. Movement in Soil:** Harmony SG moves little in the soil and disappears from the soil quickly.
- 13. Cropping Restrictions:** Do not treat wheat underseeded to forages. Do not plant to any crop until 2 months after application. Do not exceed a total of 12 g/ac of Refine SG per crop year.
Grazing restrictions: Wheat may be grazed 7 days after the application of Harmony SG.
Other restrictions: Pre-harvest interval is 60 days.
- 14. Toxicity:** Acute oral LD₅₀ (rats) = 2,276 mg/kg; Acute dermal LD₅₀ (rats) = 4,000 mg/kg.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Store product in closed, original container in a cool, dry, well ventilated room.
- 17. Resistance Management:** See page 41 for information on resistance management.

Hoe-Grass II (diclofop methyl + bromoxynil)

Group 1,6

Manufacturer: Bayer CropScience Inc.



Caution Poison

- 1. Formulations:** Emulsifiable liquid; 230 g/L diclofop-methyl + 80 g/L bromoxynil (PCP# 17507); 20 L, 110 L, 400 L containers.
- 2. Registered Mixes:** Decis: barley (except Betzes and Klages), flax, wheat, MCPA (Amine or Ester) (**only 28 mL/ac**): barley (except Betzes and Klages), spring rye, triticale, wheat.
Caution: Do not exceed, under any circumstances, the recommended amount of MCPA as a severe reduction in grassy weed control will result.
- 3. Crops:** Barley (8.4)(except Betzes and Klages), durum wheat (8.8), flax (7.6), spring rye (9.0), spring wheat (8.7), triticale (9.0).
Seedling grasses (seed production only): Bromegrass, creeping red fescue, crested wheatgrass, intermediate wheatgrass, Russian wild ryegrass.
Underseeding: Do not treat crops underseeded to legumes.

Hoe-Grass II (cont'd)**4. Weeds Controlled:**

barnyard grass (9.0)
 common groundsel (9.0)
 cow cockle (7.9)
 green foxtail (7.4)
 green smartweed (8.8)
 knawel

kochia (8.2)
 lady's-thumb
 lamb's-quarters (7.0)
 night-flowering catchfly (8.8)
 Persian dandelion (6.9)

redroot pigweed (7.2)
 Russian thistle (8.2)
 scentless chamomile (8.7)
 stinkweed (8.2)
 tartary buckwheat (7.2)

volunteer corn (8.4)
 wild buckwheat (8.0)
 wild mustard (8.3)
 wild oats (7.4)
 yellow foxtail

5. Weeds Suppressed: None.**6. When Used:**

Crop stage: Barley (except Betzes and Klages): 1 - 4 leaf and prior to tillering. Application beyond the 4 leaf stage or after tillering will result in crop damage.

Flax: 5 - 10 cm in height. During periods of stress [for example, very hot temperatures (28°C or 82°F)] or high humidity, flax may show leaf burn, retarded growth and a slight maturity delay. Avoid spraying flax under these conditions. Early evening spraying has been shown to be best.

Wheat: No leaf stage restrictions.

Grasses: 2 - 5 leaf stage.

Weed stage: Barnyard grass, foxtail, wild oats: 1 - 4 leaf. Persian dandelion: 1 - 3 leaf.

Volunteer corn: 15 - 25 cm. Broadleaf weeds: seedling to early 4 leaf stage. Russian thistle: seedling to 5 cm in height.

7. How to Apply:

With: Ground equipment only. Do not apply by air.

Rate: 1.4 L/ac.

Water volume: 45 L/ac.

Pressure: 275 kPa.

Nozzles: Only flat fan nozzles recommended.

- 8. Application Tips:** For best results and maximum yield enhancement, apply when majority of weeds are in the 2 - 3 leaf stage. During periods of stress, plants are not actively growing. When daytime temperatures are very hot (28°C or 82°F) and/or conditions are very dry and/or there is low humidity, plants are under stress. Application of Hoe-Grass during these periods may result in substantially reduced control. Under these conditions, yellow blotches may appear on crop leaves. These blotches will be rapidly outgrown and will not affect maturity or yield. Good spray coverage and penetration may be difficult if weed populations are extremely high. Apply the spray at a forward angle of 45° and ensure that weeds are young and actively growing. Hoe-Grass II must be applied at least 4 days before the use of any other herbicide to eliminate a reduction of control.

- 9. How it Works:** Diclofop-methyl possesses contact as well as systemic action. Uptake is primarily through the leaves. The site of action is the growing point. Bromoxynil is primarily a contact herbicide with limited translocation in susceptible annual broadleaf weeds.

- 10. Expected Results:** Yellowing of susceptible plants is visible within 2 - 4 days. New leaf growth exhibits light chlorosis which deepens, and browning develops within 10 - 14 days of application. Photosynthesis and growth are inhibited and uptake of water and nutrients ceases. Lack of adequate crown root development is one of the most distinguishable features of diclofop-methyl activity. Bromoxynil activity is evident within 24 hours as necrotic spots appear on the leaves of susceptible broadleaf weeds. This damage spreads rapidly until the plants ultimately die. Chlorosis may develop in the untreated leaves of these susceptible weeds even though very little movement of the bromoxynil occurs.

Precautions:

Barley: Under certain environmental conditions, yellow blotches may appear on the barley leaves. These blotches will be rapidly outgrown and will not affect maturity or yield.

- 11. Effects of Rainfall:** Rainfall within 1 hour will decrease activity.

- 12. Movement in Soil:** Some movement may occur if sufficient moisture is present.

Safety information, see page 25

13. Cropping Restrictions:**Succeeding crops:** No restriction.**Grazing restrictions:** Do not graze treated fields prior to harvest.**Drift:** Avoid treatment near susceptible crops.**14. Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = 2,350 mg/kg. Eye irritant. Toxic to fish. A small amount of vomited liquid inhaled can be fatal. May cause burns to the skin and eyes.**15. Precautions, First Aid:** Check label for first aid information.**16. Storage:** Do not store below freezing. If stored for 1 year or longer, shake well before using.**17. Resistance Management:** See page 41 for information on resistance management.

Horizon NG /NextStep/ Foothills/Signal/Ladder

(clodinafop propargyl)

Group 1

Manufacturer: Syngenta Crop Protection Canada Inc./Arysta LifeScience North America LLC/
Viterro/Nufarm Agriculture Inc./MANA Canada



Caution Poison

1. Formulations: All Emulsifiable concentrates; **Horizon NG** (PCP# 29089): 60 g/L clodinafop propargyl; 2 x 7.57 L, 121.1 L, 424.4 L containers. Adjuvant included in formulation.**NextStep** (PCP# 29278): 240 g/L clodinafop propargyl; 1 x 3.68 L + 2 x 6.4 L Steppe Adjuvant (PCP# 29281).**Foothills A** -240 g/L clodinafop propargyl (PCP# 29279): 1 x 3.68 L + 2 x 6.4 L Foothills B (PCP# 29280) adjuvant.**Signal Herbicide** (PCP# 29172): Emulsifiable concentrate; 240 gm/L clodinafop propargyl; 1 x 3.68L + 2 x 6.4L Signal adjuvant (PCP# 29173).**Ladder 240** (PCP# 29495): Emulsifiable concentrate; 240 g/L clodinafop propargyl; 1 x 3.68 L = 1 x 6.4L XA Oil Adjuvant.

2. Registered Mixes: Horizon NG/Nextstep/Foothills/Signal/Ladder tank mixes: Ally (3 g/ac), Attain (Attain A 180 - 240 mL/ac + Attain B 300 - 400 mL/ac), 2,4-D amine 500 (340 - 440 mL/ac), Buctril M (400 mL/ac), Curtail M (600 - 800 mL/ac), Decis flowable (32 - 48 mL/ac), Dichlorprop D (700 mL/ac), DyVel (500 mL/ac), Estaprop (700 mL/ac), Florasulam SC (40 mL/ac), Florasulam SC + MCPA 500 Ester (40 mL/ac + 340 mL/ac), Frontline (40mL/ac Frontline A + 283 mL/ac /Frontline B), Infinity (335 mL/ac), Lontrel (170 - 340 mL/ac), Lontrel + MCPA ester 500 (110 - 170 mL/ac + 450 mL/ac), Lontrel 360EC + Refine Extra (85 mL/ac + 8 g/ac), Matador (25 - 34 mL/ac), MCPA amine/MCPA ester 500 (340 - 440 mL/ac), MCPA Na-salt (485 mL - 1.09 L/ac), Mecroprop (2.2 - 2.8 L/ac), Mextrol 450 (500 mL/ac), Pardner (400 mL/ac), Prestige: Prestige A (243 - 324 mL/ac), Prestige B (608 - 810 mL/ac), Refine Extra (8 g/ac), Refine SG (12 g/ac), Refine SG Toss-N-Go (12 g/ac), Refine SG + Accord (Triton) water soluble bags (12 g/ac + 28 g/ac), Target (400 - 600 mL/ac), Thumper (400 mL/ac), Tilt (101 - 202 mL/ac), Trophy (240 mL/ac Trophy A + 450 mL/ac Trophy B), Turboprop 600 (700 mL/ac), Unity (200 mL/ac Unity 280 EC + 4.3 g/ac Unity 75 WG).

3. Crops: All types of durum and spring wheat.**4. Weeds Controlled:** Barnyard grass, green foxtail, Persian darnel, volunteer canary seed, volunteer oats, wild oats, yellow foxtail.

Horizon NG /NextStep/Foothills/Signal/Ladder (cont'd)

5. Weeds Suppressed: None.

6. When Used:

Crop stage: Apply prior to emergence of the 4th tiller. When tank mixing, always refer to the label of the broadleaf partner herbicide.

Weed stage:

Green and yellow foxtail, Persian dandel, barnyard grass: 1 - 5 true leaves on the main stem. (For optimum control, apply before tillering and when Persian dandel and barnyard grass are actively growing. For optimum control of green and yellow foxtail, apply prior to emergence of 3rd tiller and while foxtail is actively growing.)

Volunteer oats: 3 - 6 true leaves on the main stem and prior to emergence of the 4th tiller.

Wild oats and volunteer canary seed: 1 - 6 true leaves on the main stem and prior to emergence of the 4th tiller.

7. How to Apply:

With: Ground equipment and aerial.

Rates:

Wild oats, green and yellow foxtail, barnyard grass, volunteer oats, volunteer canary seed: 376 mL/ac Horizon NG (adjuvant included in NG formulation); 95 mL/ac Nextstep/Foothills/Signal/Ladder + adjuvant (0.8% v/v).
Above weeds + Persian dandel: 473 mL/ac Horizon NG; 115 mL/ac Nextstep/Foothills A /Signal/Ladder + Steppe/Foothills B/Signal/XA Oil adjuvant (1.0% v/v).

Water volume: Ground: 40 L/ac. Air: 12 L/ac.

Pressure: 275 - 310 kPa.

Nozzles: 80° or 110° flat fan stainless steel nozzles are recommended for optimal spray coverage.

Mixing instructions: Use mixing procedure "c" on page 12.

Sprayer cleanup: Use cleanup method C on page 16. If using a tank mix partner, refer to that product for additional cleanup procedures.

- 8. Application Tips:** For optimum results, apply Horizon to actively growing weeds. An early application will maximize crop yields by reducing weed competition. Application of the spray mixture at a 45° angle in the direction of travel will result in improved spray coverage. Do not use flood type nozzles, controlled droplet application equipment, spray foils or hollow cone nozzles. Weeds emerging after application will not be controlled. Do not apply to crop stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result.
- 9. How it Works:** Horizon NG/Nextstep/Foothills/Signal/Ladder are absorbed by the leaves and is rapidly translocated to the growing points of leaves and stems. Thorough coverage of the plants is essential for consistent control.
- 10. Expected Results:** Grassy weeds – Depending on species, growing conditions and crop competition, leaves and growing points turn yellow within one to three weeks after application. Further colour changes and loss of vigor will be observed, followed by a browning and complete control 3 - 5 weeks after application.
- 11. Effects of Rainfall:** Rainfall within 30 minutes of application may reduce the effectiveness of Horizon.
- 12. Movement in Soil:** None.
- 13. Cropping Restrictions:** Do not treat wheat underseeded to forages.
Grazing restrictions: Observe a minimum of 3 days before grazing livestock on crops treated with Horizon.
Pre-harvest interval: 60 days.
- 14. Toxicity:** Acute Oral LD₅₀ (rats) = 2,276 mg/kg; Acute dermal (rats) = 4,000 mg/kg.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Store the product in closed, original container in a well ventilated room.
- 17. Resistance Management:** See page 41 for information on resistance management.

Hyvar X/X-L (bromacil)

Group 5

Manufacturer: E.I. duPont Canada Co.

Herbicides

1. **Formulations:** Hyvar X: Wettable powder; 80% (PCP# 8637); 2 kg, 25 kg bags.

Hyvar X-L: Water soluble liquid; 240 g/L; 4 L, 10 L jugs.

2. **Registered Mixes:** None.

Mixing instructions: Hyvar X: Weigh out proper amount of Hyvar X and mix into necessary volume of water (minimum 20 L/kg of Hyvar X). Agitate continuously by mechanical or hydraulic means.

3. **Crops:** Non-crop areas only. Total vegetation control.

4. **Weeds Controlled:** A non-selective, total vegetation control chemical for weeds, grasses and some brush.

5. **Weeds Suppressed:** Not applicable.

6. **When Used:** Just before or during the period of active weed growth. Do not apply when ground is frozen.

Brush: Apply in spring or summer as a basal (spot) treatment.

7. **How to Apply:**

Hyvar X-L:

With: Power sprayer. Handguns, backpack sprayers or a watering can may be used to treat small areas.

Rate:

Initial treatment: Apply 12 - 18 L/ac. Higher dosage on soils containing 5% or more organic matter, or soils high in clay content. Maximum use rate of 22.67 L/ac.

Retreatment of regrowth: 7 - 9 L/ac. Apply no more than 2 applications of Hyvar X-L per year.

Small areas: 450 mL/100 m².

Brush control: Spot Treatment Undiluted: At 8 mL/m of tree height up to 3 m. Four or five 8 mL deposits around the root collar for brush taller than 3 m with a spot gun. Spot Treatment Diluted: mix 1 L in 5 L of water, apply in 55 mL deposits with a spot gun.

Hyvar X:

With: Same as Hyvar X-L, except more efficient agitation of the spray solution is required.

Rate:

Initial treatment: 3 - 5 kg/ac. Use the higher dosage on soils containing 5% or more organic matter, or soils high in clay content. Maximum use rate of 6.8 kg/ac.

Retreatment of regrowth: 1.5 - 2.7 kg/ac. Apply no more than 2 applications of Hyvar X per year.

Small areas: 135 g/100 m².

Brush control: Mix 870 g Hyvar X in 10 L of water and apply 30 - 60 mL/stem 5 - 10 cm in basal diameter. Wet base of stem to point of runoff.

Water volume: 100 - 1,000 L/ac. Use enough water to uniformly cover the area to be treated. Hyvar X-L: With a handgun, apply 650 L of spray solution/ac. Hyvar X: Minimum of 20 L of water/kg of Hyvar X.

Nozzles: Screens should be 50 mesh or larger.

8. **Application Tips:**

Weed control: If dense growth is present, results will be improved if vegetation is removed before treatment. Do not apply closer than 1.5 times the height of nearby trees. Roots from large trees may extend well beyond the height of the tree and may extend beneath areas to be treated. Be cautious where trees are in close proximity to the treatment site. Do not apply to brush standing in water, lawns, walks, driveways, tennis courts or similar areas. Applying, draining or flushing equipment too near feeding roots of susceptible vegetation may cause injury. Thoroughly clean all traces of Hyvar from application equipment immediately after use.

Safety information, see page 25

Hyvar X/X-L (cont'd)

Buffer zone: A buffer zone of 65 metres is required between the point of direct application and the closest downwind edge of sensitive aquatic habitat (such as rivers, lakes, sloughs, ponds, prairie potholes, creeks, marshes, streams, reservoirs and wetlands).

Do not exceed 22.66 L/ac per year of Hyvar X-L (Hyvar X: 15.06 lb/ac per year).

9. **How it Works:** Hyvar X is readily absorbed through the roots but much less readily through the leaves. Once in the plant, it inhibits photosynthesis.
10. **Expected Results:** Susceptible plants become chlorotic and then die. Vegetation kill is faster with higher rainfall. Degree and duration of control depends on amount of chemical applied, soil type, rainfall and other conditions. Brush: final kill may not take place until the year following treatment.
Poor results may be expected if weed growth too mature or if there is insufficient rainfall.
11. **Effects of Rainfall:** Rainfall will carry the chemical into the root zone where it is absorbed.
12. **Movement in Soil:** Movement in soil is dependent upon soil type and soil moisture. Bromacil will move faster in a vertical direction in sandy soils than in soils high in organic matter or clay content. Movement can be severe on slopes.
13. **Cropping Restrictions:**
Drift: All crops and ornamentals may be injured by chemical drift. Do not apply in areas subject to severe soil erosion.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) = 5,200 mg/kg. Toxic to fish. Intake of Hyvar X-L can cause damage to lungs, liver, heart and kidney and can lead to a coma. May also cause blindness.
15. **Precautions, First Aid:** Hyvar X-L is combustible. While applying undiluted product, do not smoke and keep away from heat and open flame. Check label for first aid information.
16. **Storage:** Hyvar X: Store in a cool, dry place. Hyvar X-L: Combustible, keep away from heat or open flame. Do not allow to freeze.

Infinity *(pyrasulfotole + bromoxynil)*

Group 27,6

Manufacturer: Bayer CropScience Inc.

1. **Formulations:** Emulsifiable concentrate; 37.5 g/L pyrasulfotole, 210 g/L bromoxynil (PCP# 28738); 2 x 6.7 L jug.
2. **Registered Mixes:** **Spring wheat, durum wheat:** Achieve Liquid, Axial (spring wheat only), Puma¹²⁰ Super, Horizon. **Winter wheat:** Achieve Liquid. **Barley:** Achieve Liquid, Axial, Puma¹²⁰ Super. **Triticale:** Achieve Liquid.
Mixing instructions: Fill the spray tank 1/4 to 1/2 full with clean water and begin agitation or bypass. Add the appropriate rate of Infinity herbicide directly to the spray tank. Maintain sufficient agitation during both mixing and application. Add tank mix partners, if desired. Fill the spray tank with balance of water required. Maintain sufficient agitation during both mixing and application of Infinity herbicide.
3. **Crops:** Barley, wheat (durum, spring, winter), triticale, timothy (seed production).

4. Weeds Controlled¹:

annual sow thistle
chickweed
cleavers^{2,3}
common ragweed

flixweed
hemp-nettle
kochia
lamb's-quarter

pale smartweed
redroot pigweed
Russian thistle (8.4)
shepherd's-purse

stinkweed
volunteer canola
wild buckwheat
wild mustard

¹ Includes ALS (Group 2) resistant biotypes.

² For control of cleavers at the 4 to 6 whorl growth stage, add ammonium sulphate at 202 g/ac (99%) or 404 ml/ac (49% solution). If using an ammonium sulphate product with a different concentration, adjust the rate accordingly.

³ Includes indoleacetic acid (Group 4) resistant biotypes.

5. Weeds Suppressed: Canada thistle, dandelion⁴, perennial sow thistle, round-leaved mallow.

⁴ Includes seedlings and overwintered rosettes.

6. When Used:

Crop stage: Barley, wheat (durum, spring, winter), triticale, timothy: 1 leaf stage until flag leaf is just visible but still rolled.

Weed stage: Weeds controlled from 1 - 6 leaf or whorl stage: annual sow thistle, chickweed, cleavers*, hemp-nettle, lamb's-quarter, pale smartweed, redroot pigweed, shepherd's-purse, stinkweed, volunteer canola**, wild buckwheat and wild mustard.

Flixweed and Russian thistle: Up to 10 cm in height.

Canada thistle suppression up to 30 cm in height, dandelion suppression (seedling or overwintered rosettes) up to 10 cm in height or 25 cm in diameter.

* For control of cleavers at the 4 to 6 whorl growth stage, add ammonium sulphate at 202 g/ac (99%) or 404 g/ac (49% solution).

** All types of volunteer canola, including herbicide tolerant.

7. How to Apply:

With: Aircraft or ground equipment.

Rate: 0.335 L/ac. Apply only once per season.

Water volume: Air: minimum of 11.3 L/ac. Ground: minimum of 18.9 L/ac.

Pressure: Air: not less than 300 kPa. Ground: 275 kPa.

Nozzles: Only 110° or 80° flat fan recommended for optimum spray coverage and canopy penetration. Do not use flood jet nozzles, controlled droplet application equipment or Sprayfoil spray equipment. Uniform, thorough spray coverage is important to achieve consistent weed control. Higher water volumes should be used under dense crop and weed canopies to ensure thorough coverage of the target weeds.

8. Application Tips: For best results, apply to emerged, young, actively growing weeds. Under cool and/or dry conditions, activity may be reduced or delayed. Weed control may also be reduced if application is made when weeds are dust covered or in the presence of heavy dew, fog or mist/rain. If crop is under stress due to abnormal environmental conditions, delay application until stress passes and after both crop and weeds have resumed active growth.**9. How it Works:** Pyrasulfotole is absorbed through leaves and is translocated to meristematic regions where it inhibits the HPPD enzyme. Pyrasulfotole inhibits plant pigment biosynthesis and photosynthesis.**10. Expected Results:**

Weeds: Small burnt spots on the leaf can appear in hours. Lack of plant pigments shuts down the photosynthetic pathway, resulting in bleaching symptoms and rapid death, normally in 6 - 14 days.

11. Effects of Rainfall: Rainfall within 1 hour of application may reduce effectiveness.**12. Movement in Soil:** In typical agricultural soils, a half-life of 7 - 31 days. Rapid degradation offsets potential for lateral or downward movement in the soil.

Infinity (cont'd)

13. Cropping Restrictions:

Succeeding crops: The following crops can be planted 10 months after application: alfalfa, barley, canaryseed, canola, flax (including low linolenic acid varieties), field peas, oats, spring and durum wheat. The following crops can be planted 22 months after application: Lentils.

Grazing restrictions: Do not graze the treated crops or cut for forage or hay within 25 days after application.

Do not harvest wheat or triticale for grain or straw within 50 days of application. Do not harvest barley for grain or straw within 45 days of application. If tank mixing, always respect the maximum pre-harvest interval stated on labels of all the tank mix products.

14. **Toxicity:** Pyrasulfotole is practically non-toxic to wild mammals, birds, fish and aquatic invertebrates, earthworms and bees and does not negatively affect soil microorganisms. Infinity is toxic to aquatic plants and non-target terrestrial plants.

15. **Precautions, First Aid:** Check label for first aid information.

Do not enter or allow worker entry into treated areas until 12 hours after application.

16. **Storage:** Do not store at temperatures below -20°C. If stored for one year or longer, shake well before using.

17. **Resistance Management:** See page 41 for information on resistance management.

Karmex XP/Diurex 80W (diuron)

Group 7

Manufacturer: E.I. duPont Canada Co./MANA Inc./United Agri Products Canada Inc. (distributor)

1. **Formulations:** Karmex XP: Dry flowable; 80% (PCP# 21252); 2 kg, 25 kg pack.
Diurex 80WDG: Granule; 80% diuron (PCP# 14135).

2. **Registered Mixes:** None.

Mixing instructions: Agitate continuously by mechanical or hydraulic means.

3. **Crops:** Asparagus, dug-outs, irrigation and drainage ditches, ponds and spot treatment for general weed control. Non-crop areas.

4. **Weeds Controlled:** Broadleaf and grassy weed seedlings.

5. **Weeds Suppressed:** Not applicable.

6. **When Used:** May be used at any time, except when the ground is frozen. Best results obtained when applied shortly before weed growth begins. Dense weed growth should be removed first, then treatment applied. Sufficient rainfall or irrigation is necessary following treatment to carry the chemical to the root zone.

Asparagus (established): No earlier than 4 weeks before spear emergence and no later than the early cutting period.

Irrigation and drainage ditches: Before expected seasonal rainfall, if possible, when soil in the ditch is still moist. Apply during the non-crop season when the ditch is not in use.

7. **How to Apply:**

With: Field sprayer, hand sprayer, back-pack or sprinkling can.

Rate:

General weed control: Sandy or sandy loam soils 5.8 - 11 kg/ac. Clays or high organic soils 16 - 22 kg/ac. Use the lower rate when annual weed growth predominates and where only one season's control is desired.

Retreatment of regrowth: Annuals and seedlings 500 g/ac.

Safety information, see page 25

Irrigation and drainage ditches: 250 - 750 g/100 m² or 9.3 - 27 kg/ac. Flush once before using for irrigation purposes. Karmex must be fixed in the soil by moisture to minimize movement in irrigation water.

Spot treatment: Quackgrass, toadflax 0.75 - 1.0 kg/100 m².

Small areas: 50 g/10 m² is equal to 20.2 kg/ac.

Water volume: Use 100 - 160 L of water/acre to provide thorough, uniform coverage.

Nozzles: Screens should be 50 mesh or larger.

8. **Application Tips:** Do not use on sand, loamy sand or gravelly soils with less than 1% organic matter. Spray booms must be shut off while starting, turning, slowing or stopping as injury to the crop may result. Do not apply to newly seeded asparagus or to young plants during the first growing season after setting or on plants with exposed roots as severe injury may result. **Do not apply to slopes as soil erosion may occur.** Applying, draining or flushing equipment too near feeding roots of susceptible vegetation may cause injury. Do not use on lawns, walks, driveways, tennis courts or similar areas. Thoroughly clean all traces of Karmex from application equipment after use.
9. **How it Works:** Diuron is readily absorbed through the root system and less readily absorbed through stem and foliage.
10. **Expected Results:** Susceptible plants become chlorotic soon after treatment and then die. Degree of control and duration of effect will vary with the amount of chemical applied, soil type, rainfall and other conditions. Regrowth of plantain, thistle, or wild carrot will indicate that retreatment is necessary. **Poor control may be expected if** inadequate rate or weeds too old or insufficient rainfall.
11. **Effects of Rainfall:** Rainfall will activate the chemical, carrying it into the root zone.
12. **Movement in Soil:** Diuron absorbs readily to the soil, and there is little movement by leaching.
13. **Cropping Restrictions:**

Drift: All crops and ornamentals may be injured by chemical drift.

Succeeding crops: Do not replant treated areas to any crop within 2 years after last treatment as injury to subsequent crops may result.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) = 3,400 mg/kg. Non-toxic to birds and fish.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Store in a cool, dry place.
17. **Resistance Management:** See page 41 for information on resistance management.

Krenite (fosamine-ammonium)

Group 27

Manufacturer: E.I. duPont Canada Co.

1. **Formulations:** Water soluble liquid; 480 g/L (PCP# 14064); 10 L pack.
2. **Registered Mixes:** None.
- Non-ionic surfactants: Tween 20.
3. **Crops:** Brush control on non-crop areas only.
4. **Weeds Controlled:**

alder	beech	elm	largetooth aspen*	pine
ash	birch	hazel	maple	trembling aspen poplar
balsam fir*	cherry*	hemlock*	oak	white spruce*

* Highest rate.

Safety information, see page 25

Krenite (cont'd)

- 5. Weeds Suppressed:** Not applicable.
- 6. When Used:** From mid-June to end of July.
- 7. How to Apply:**
 - With:** High volume ground equipment.
 - Rate:** 10.0 - 15.0 L/1,000 L of water. Add 1 - 2 L of surfactant to the mixture. Use higher rate for balsam fir, cherry, hemlock, largetooth aspen, white spruce.
 - Water volume:** 200 - 1,200 L of spray solution/ac to point of runoff.
 - Nozzles:** Flat fan recommended.
- 8. Application Tips:** Do not apply to food crops. A non-ionic surfactant is required to control most conifers and to control the root suckering of deciduous brush.
- 9. How it Works:** Absorbed by leaves, stems and buds. Restricts bud development the following spring.
- 10. Expected Results:** Injury may not be observed until the following spring, particularly if minimum rates are used or if cool temperatures prevail when spraying is done. Plants will fail to develop leaves and subsequently die.
- 11. Effects of Rainfall:** Rainfall within 24 hours of application may reduce effectiveness.
- 12. Movement in Soil:** Little downward movement as Krenite readily adsorbs to soil colloids.
- 13. Cropping Restrictions:**
 - Grazing restrictions:** Do not graze on land treated with Krenite.
- 14. Toxicity:** Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) = 24,000 mg/kg. Non-toxic to birds and fish.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Store in a cool, dry place.

Krovar I (bromacil + diuron)**Group 5,7**

Manufacturer: E.I. duPont Canada Co.

- 1. Formulations:** Dry flowable; 40% bromacil + 40% diuron (PCP# 22964); 2 kg, 25 kg bags.
- 2. Registered Mixes:** Telar at 48 g/ac + surfactant.
 - Mixing instructions:** Weigh out the proper amount of Krovar and mix into necessary volume of water (minimum 20 L water/kg of Krovar). Agitate continuously by mechanical or hydraulic means. Do not use air agitation. If mixing with Telar, add the Telar first, then the required amount of Krovar, then surfactant.
- 3. Crops:** Non-crop areas only. Total vegetation control.
- 4. Weeds Controlled:** Most annual and perennial weeds and grasses.
- 5. Weeds Suppressed:** Not applicable.
- 6. When Used:**
 - Weed stage:** Before weeds emerge or when actively growing. Remove dense growth before treatment. Do not apply when ground is frozen. Sufficient moisture is required to carry the chemical to the root zone of the weeds.
- 7. How to Apply:**
 - With:** Boom sprayer, handgun, back pack or sprinkling can.

Safety information, see page 25

Krovar I (cont'd)

Rate:

General weed control: 5.3 - 7.3 kg/ac. Use higher rates on soils containing 5% or more organic matter or soils high in clay content. Use 5.5 kg/ac on sandy or sandy loam soils only.

Retreatment of regrowth: 2.75 - 3.6 kg/ac when annual weeds reappear on previously treated sites. Maximum total rate/year is 13.6 kg/ac. **No** more than 2 applications per year.

Small areas: 180 g/100 m², approximately 7.3 kg/ac.

Water volume: 20 L water (minimum)/kg of Krovar I. 100 - 1,000 L/ac. Use enough water to uniformly cover area to be treated.

Nozzles: Screens should be 50 mesh or larger.

- 8. Application Tips:** Applying, draining or flushing equipment too near feeding roots of susceptible vegetation may cause injury. Do not use on lawns, walks, driveways, tennis courts or similar areas. **Do not apply to slopes as soil erosion may occur.** Thoroughly clean all traces of Krovar I from application equipment immediately after use.

Buffer zone: A buffer zone of 65 metres is required between the point of direct application and the closest downwind edge of sensitive aquatic habitats (such as creeks, marshes, streams, reservoirs and wetlands).

Do not exceed the limit of 13.6 kg/ac/year.

- 9. How it Works:** Readily absorbed through the roots, leaves and stems.
- 10. Expected Results:** Plants become chlorotic and then die. The degree of control and duration of effect will vary with the amount of chemical applied, soil type, rainfall and other factors. **Poor results occur if** weeds are too mature or if insufficient rainfall.
- 11. Effects of Rainfall:** Rainfall will leach the chemical into the root zone.
- 12. Movement in Soil:** Movement in soil is faster with heavier rainfall. Do not use in areas subject to soil erosion.
- 13. Cropping Restrictions:**
Drift: All crops and ornamentals may be injured by chemical drift.
Succeeding crops: Krovar I is a non-selective residual herbicide. It should only be used on non-crop areas where bare ground is desired.
- 14. Toxicity:** Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) = bromacil 5,200 mg/kg, diuron = 3,400 mg/kg. Non-toxic to birds. Toxic to fish.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Store in a cool, dry place.
- 17. Resistance Management:** See page 41 for information on resistance management.

Laddok (bentazon + atrazine)

Group 6,5

Manufacturer: BASF Canada



Caution Poison

- 1. Formulations:** Liquid suspension; 200 g/L bentazon + 200 g/L atrazine (PC# 16641); 1 x 10 L.
- 2. Registered Mixes:** None.
Surfactant: Assist oil concentrate at 1.0 L per 100 L of spray solution.
- 3. Crops:** Field corn, seed corn, silage corn, sweet corn. Seed corn producers should consult the seed corn company regarding tolerance of seed production lines to Laddok + Assist oil concentrate.

Laddok (cont'd)

4. Weeds Controlled:

annual smartweeds	common groundsel*	lady's-thumb	Russian thistle
bird rape*	common ragweed*	lamb's-quarters*	velvetleaf
black nightshade	corn spurry	low cudweed	Venice mallow
buttercup	giant ragweed	purslane	wild mustard
cocklebur	hairy galinsoga	redroot pigweed*	yellow nutsedge
common chickweed	jimsonweed		

* Triazine resistant strains of these weeds are controlled by Laddok.

5. Weeds Suppressed: None.

6. When Used: Crop stage: Apply before corn is 30 cm in height.

Weed stage: Apply early post-emergence when weeds are small and actively growing (usually corresponds to corn growth stages of 1 - 5 leaves). Under good growing conditions, the most effective time for application usually is 18 - 28 days after planting. Cultivation may be necessary if additional weeds emerge after the application.

7. How to Apply:

With: Ground equipment.

Rate: 1.21 - 1.62 L/ac. Use the rate appropriate for weed size as shown in the application rate table of the Laddok label. Where **Dual II Magnum** has been applied as a pre-emergent grass herbicide, the application rate of Laddok may be reduced to 0.8 - 1.0 L/ac. Assist oil concentrate at 1.0 L/100 L of spray volume should be added for all applications of Laddok.

Water volume: 80 - 160 L/ac.

Pressure: 275 - 400 kPa.

Nozzles: Flat fan or cone type only recommended.

8. Application Tips: Best weed control is under warm, humid conditions. Best results if weeds are young and actively growing. Do not apply where runoff erosion is likely to occur. Do not apply if crop is under stress from prolonged cold weather, poor fertility or when crop is wet and succulent from recent rainfall as crop injury may occur. It is important to obtain complete spray coverage of all leaves for best control.

9. How it Works: Both bentazon and atrazine are contact herbicides interfering with photosynthesis.

10. Expected Results:

Weeds: Turn yellow, then brown, usually within 2 weeks.

Crops: Occasionally show light leaf speckling. Corn plants generally outgrow this condition within 10 days. Poor results may occur if weeds are too mature, if spray fails to penetrate crop canopy or under conditions of prolonged cool weather or drought.

11. Effects of Rainfall: Within 6 - 8 hours may reduce activity.

12. Movement in Soil: Very little, except in sandy soil and with excessive moisture.

13. Cropping Restrictions:

Pre-harvest interval: Field corn - 60 days; sweet corn - 45 days.

Succeeding crops: On very light soils with low organic matter, some atrazine may carryover and injure susceptible crops. Injury may also occur if land treated with Laddok is planted to any crop other than corn in the same season.

Grazing restrictions: Treated plants can be used for silage.

14. Toxicity: Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = 3,000 mg/kg. Intake may cause convulsions and coma.

15. Precautions, First Aid: Check label for first aid information.

If in eyes or on skin, use standard first aid measures. **If swallowed,** seek medical attention.

16. Storage: Store in a cool, dry place above 0°C.

17. Resistance Management: See page 41 for information on resistance management.

Safety information, see page 25

Liberty 150 SN *(glufosinate ammonium)*

Group 10

Manufacturer: Bayer CropScience Inc.



Caution Poison

Herbicides

- 1. Formulations:** Liquid; 150g/L (PCP# 26694); 13.5 L jug, 108 L.

To purchase Liberty 150 SN herbicide, growers must have a signed and approved Liberty and Trait Agreement (LTA)

- 2. Registered Mixes:** Poast Ultra (95 mL/ac), Select (25mL/ac), Centurion (25 mL/ac).

- 3. Crops:** Canola varieties tolerant to Liberty. These varieties will be labelled with Liberty Link symbol.

- 4. Weeds Controlled:**

barnyard grass	green foxtail	redroot pigweed	volunteer canola
cleavers	hemp-nettle	round-leaved mallow	volunteer flax
common chickweed	kochia	scentless chamomile	volunteer wheat
cow cockle	lady's-thumb	smartweed	wild buckwheat
dandelion	lamb's-quarters	stinkweed	wild mustard
flixweed	perennial sow thistle	stork's-bill	wild oats

- 5. Weeds Suppressed:** Canada thistle, quackgrass, volunteer barley.

- 6. When Used:** Crop stage: Liberty Link Canola: cotyledon stage up to the early bolting stage of canola. Slight discolouration of the canola may be visible after application. This effect is temporary and will not influence crop growth, maturity or yield.

- 7. How to Apply:**

With: Ground equipment and by air.

Rate: Best control will be obtained when Liberty is applied in the recommended leaf stages of Liberty Link canola.

Liberty two-pass option: For fields with high weed densities or newly emerged weed seedlings, a second application of 1.08 L/ac (**12.5 ac/jug**) to 1.35L/ac (10 ac/jug) of Liberty 150 SN can be sprayed after an initial application of up to 1.6L/ac. Liberty 150 SN can be sprayed up to a maximum 2.97L/ac per season.

Apply Liberty at 810 mL/ac

Weed	Leaf stage	Weed	Leaf stage
barnyard grass	1 - 4 leaves	smartweed	1 - 6 leaves
cow cockle	1 - 4 leaves	stinkweed	1 - 8 leaves
green foxtail*	1 - 6 leaves (maximum 3 tillers)	volunteer canola	1 - 4 leaves
lady's-thumb	1 - 6 leaves	volunteer flax	up to 6 cm
lamb's-quarters	1 - 6 leaves	wild mustard	1 - 5 leaves
Russian thistle	up to 8 cm		

* Fields with only green foxtail; 538 mL/ac.

Apply Liberty at 1.08 L/ac

Weed	Leaf stage	Weed	Leaf stage
Canada thistle	10 cm height	redroot pigweed	1 - 4 leaves
(top growth suppression only)**		round-leaved mallow	1 - 4 leaves
common chickweed	1 - 4 leaf pairs	scentless chamomile	up to 10 cm
hemp-nettle	1 - 3 leaf pairs	shepherd's-purse	1 - 6 leaves

continued

Safety information, see page 25

Liberty 150 SN (cont'd)

continued

kochia	up to 8 cm	volunteer barley**	1 - 4 leaves (maximum 2 tillers)
perennial sow thistle	1 - 8 leaves	(suppression only)	
quackgrass	1 - 4 leaves	volunteer wheat**	1 - 4 leaves (maximum 2 tillers)
(top growth suppression only)		wild buckwheat**	1 - 3 leaves

** Use 1.35 L/ac for heavy populations. For control of volunteer barley, add Venture at 40 - 80 g/ac with recommended adjuvant. For control of volunteer barley and wild oats, add Select, Centurion or Arrow at 25 mL/ac plus adjuvant recommended on the Select label. For improved volunteer barley control, add Poast Ultra at 95 mL/ac plus Merge at 200 mL/ac using 45 L/ac water volume.

Apply Liberty at 1.35 L/ac

Weed	Leaf stage	Weed	Leaf stage
cleavers	1 - 2 whorls	quackgrass (season-long control)	1 - 4 leaves
dandelion	1 - 15 cm rosette	stork's-bill	1 - 3 leaves
flixweed	1 - 10 cm	wild oats	1 - 4 leaves (maximum 2 tillers)
hemp-nettle	1 - 4 leaf pairs		

For control of volunteer barley and enhanced control of wild oats, add Select at 25 mL/ac plus adjuvant recommended on Select, Centurion or Arrow label.

Apply Liberty at 1.62 L/ac

Weed	Leaf stage
Canada thistle (better top growth suppression)	10 cm height
quackgrass (season-long control for heavy populations)	1 - 4 leaves

Second application: A second application of Liberty can be made to fields treated initially with up to 1.6L/ac. if new weed germination or growth is present. Apply when the new weed growth is in the correct leaf stage and up to the early bolting stage of canola growth. Apply at a rate of 1.08 - 1.35 L/ac in the second application.

Water volume: Ground: Minimum of 45 L/ac of water. Air: Minimum of 22 L/ac of water, when used post-emergent in Glufosinate tolerant canola.

Pressure: 275 kPa (310 kPa if check valves used).

Nozzles: Only 110° or 80° flat fan recommended for optimum spray coverage and canopy penetration. Application of the spray at a 45° angle forward will result in better spray coverage. **Do not use flood jet nozzles, controlled droplet application equipment or air-assisted spray equipment. Uniform, thorough spray coverage is important to achieve consistent weed control.**

Mixing instructions:

Liberty:

1. Fill tank within one-half the amount of clean water.
2. Add the correct amount of Liberty.
3. Add the remaining amount of water, begin agitation and spray out immediately.

Liberty and Select, Centurion: Liberty Link canola only. When tank mixing Liberty and Select, Centurion, always add adjuvant to the tank first, then add Liberty to the tank followed by Select, Centurion.

1. Thoroughly clean the sprayer by flushing the system with water containing detergent.
2. Fill clean spray tank half full with clean water. Start agitation system.
3. Add the required amount of adjuvant to the tank. Continue to agitate until thoroughly mixed.
4. **Stop** agitation. Add the correct amount of Liberty to the spray tank. Start agitation system.
5. Add the correct amount of Select, Centurion along with the remaining amount of water needed to fill the spray tank.

Safety information, see page 25

6. Continue to agitate or run the by-pass system and spray out immediately.
7. After any break in the spraying operation, agitate thoroughly before spraying again. Check inside the tank to ensure that sprayer agitation is sufficient to remix the spray materials. Do not allow the mixture to sit overnight.
8. If an oil film starts to build-up in the tank, drain it and clean tank with strong detergent solution.
9. Immediately after use, thoroughly clean the sprayer by flushing the system with clean water containing detergent.

Note: Ensure that all circuits (pipes, booms, etc.) have the correct Liberty/water concentration before application is started.

Note: The addition of an anti-foaming agent may reduce foaming, especially when using soft water.

Sprayer cleanup: Before and after using Liberty, always complete a thorough cleaning of the spray tank, lines and filter. Spray equipment should be thoroughly rinsed using a strong detergent solution.

8. **Application Tips:** For best results, apply to emerged, young actively growing weeds. Weeds that emerge after application will not be controlled. Liberty will have an effect on weeds larger than the recommended leaf stage; however, speed of activity and control may be reduced.
9. **How it Works:** Liberty works primarily as a contact herbicide. Thorough coverage of the weeds to be controlled is essential. Absorbed by all leaf and stem surfaces. Interferes with plants' ability to detoxify ammonia. The speed of action of Liberty is influenced by environmental factors. At cool temperatures (below 10°C), poor moisture and low humidity, speed of action may be reduced.
10. **Expected Results:** Generally, visual symptoms appear 2 - 4 days after application. When a rate range is given, the higher rate should be used:
 1. When weed or crop growth is dense.
 2. When the weeds are large and/or mature - i.e. advanced leaf stages and plant height.
 3. When environmental conditions are cool and dry.
11. **Effects of Rainfall:** If rainfall occurs within 4 hours of application, effectiveness may be reduced.
12. **Movement in Soil:** Liberty breaks down rapidly in the soil, which will effectively limit soil movement.
13. **Cropping Restrictions:** Do not graze the treated crop or cut for hay; sufficient data are not available to support such use. (There are no cropping or rotational restrictions after application).
14. **Toxicity:** Acute oral LD₅₀ (male rats) = 2,270 mg/kg; female rats = 1,730 mg/kg. Moderate dermal irritant. No allergic potential.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Do not store below freezing. If stored for one year or longer, shake well before using.
17. **Resistance Management:** See page 41 for information on resistance management.

Liberty 200 SN (glufosinate ammonium)

Group 10

Manufacturer: Bayer CropScience Inc.



Caution Poison

1. **Formulations:** Liquid; 200 g/L (PCP# 25337); 10 L jug.
 To purchase Liberty 200 SN herbicide, growers must have a signed and approved Liberty and Trait Agreement (LTA)
2. **Registered Mixes:** Ammonium sulfate.
3. **Crops:** Field corn varieties tolerant to Liberty. These varieties will be labeled with a Liberty Link symbol.

Liberty 200 SN (cont'd)**4. Weeds Controlled:**

barnyard grass	fall panicum	perennial sow thistle	velvetleaf
bristly foxtail	giant foxtail	proso millet	wild buckwheat
chickweed	green foxtail	ragweed	wild mustard
cocklebur	lady's-thumb	redroot pigweed	wild oats
crabgrass	lamb's-quarters	stinkweed	wormseed mustard
eastern black nightshade	old witch grass	shepherd's-purse	yellow foxtail

5. Weeds Suppressed: Canada thistle, field bindweed, quackgrass.

6. When Used: Crop stage: Liberty Link Corn 1 - 8 leaf stage or 5 - 6 visible collars.

7. How to Apply:

With: Ground equipment only.

Rate:

Apply Liberty at 0.6 L/ac

Weed	Leaf stage	Weed	Leaf stage
crabgrass	1 - 5 leaves	proso millet	1 - 5 leaves
chickweed	1 - 8 leaves	shepherd's-purse	1 - 6 leaves
cocklebur	1 - 4 leaves	ragweed	1 - 5 leaves
giant foxtail	1 - 5 leaves	redroot pigweed	1 - 6 leaves
green foxtail	1 - 5 leaves		

Apply Liberty at 0.8 L/ac

Weed	Leaf stage	Weed	Leaf stage
barnyard grass	1 - 5 leaves	perennial sow thistle	1 - 4 leaves
bristly foxtail	1 - 4 leaves	ragweed	1 - 7 leaves
Canada thistle (suppression)	1 - 6 leaves	stinkweed	1 - 8 leaves
eastern black nightshade	1 - 5 leaves	velvetleaf*	1 - 4 leaves
fall panicum	1 - 4 leaves	wild buckwheat	1 - 4 leaves
field bindweed (suppression)	1 - 6 leaves	wild mustard	1 - 4 leaves
lady's-thumb	1 - 6 leaves	wild oats	1 - 4 leaves
lamb's-quarters	1 - 6 leaves	wormseed mustard	1 - 6 leaves
old witchgrass	1 - 4 leaves	yellow foxtail	1 - 4 leaves

Quackgrass – for season long suppression of quackgrass, apply Liberty 200 SN at a rate of 1 L/ac plus ammonium sulphate at a rate of 2.4 L/ac (49% solution) or 2.67 lbs/ac (99%) when quackgrass is in the 1 - 4 leaf stage.

***Additives:** For enhanced control of velvetleaf, add ammonium sulphate to the tank at a rate of 2.4 L/ac (49% solution) or 2.67 lbs/ac (99%).

Second application: A second application of Liberty 200 SN can be made to fields treated initially with up to 1 L/ac if new weed germination or growth is present. Apply when the new weed growth is in the correct leaf stage and up to the maximum leaf stage of the crop. Application after the 8 leaf stage of corn must be made with drop nozzles as a directed spray below the whorl of the corn plant.

Do not apply more than a total of 1.8 L/ac in one season.

Split application program: For season-long control of the above weeds, a split application program with Liberty 200 SN can be utilized. The first application must be a minimum of 0.8 L/ac and at the proper weed stage. For the second application, the rate of 0.5 L/ac may be utilized provided Liberty 200 SN is applied as

Safety information, see page 25

soon as the second flush of weeds occurs and before the maximum leaf stage of the crop.

Water volume: Minimum of 45 L/ac.

Pressure: 175 - 275 kPa.

Nozzles: Only 110° or 80° flat fan recommended for optimum spray coverage and canopy penetration. Application of the spray at a 45° angle forward will result in better spray coverage. Do not use flood jet nozzles, controlled droplet application equipment or air-assisted spray equipment. **Uniform, thorough spray coverage is important to achieve consistent weed control.**

Note: The addition of an anti-foaming agent may reduce foaming, especially when using soft water.

Sprayer cleanup: Before and after using Liberty, always complete a thorough cleaning of the spray tank, lines and filter. Spray equipment should be thoroughly rinsed using a strong detergent solution.

8. **Application Tips:** For best results, apply to emerged, young actively growing weeds. Weeds that emerge after application will not be controlled. Liberty will have an effect on weeds larger than the recommended leaf stage; however, speed of activity and control may be reduced.
9. **How it Works:** Liberty works primarily as a contact herbicide. Thorough coverage of the weeds to be controlled is essential. Absorbed by all leaf and stem surfaces. Interferes with plants' ability to detoxify ammonia. The speed of action of Liberty is influenced by environmental factors. At cool temperatures (below 10°C), poor moisture and low humidity, speed of action may be reduced.
10. **Expected Results:** Generally, visual symptoms appear 2 - 4 days after application. When a rate range is given, the higher rate should be used:
 1. When weed or crop growth is dense.
 2. When the weeds are large and/or mature - i.e. advanced leaf stages and plant height.
 3. When environmental conditions are cool and dry.
11. **Effects of Rainfall:** If rainfall occurs within 4 hours of application, effectiveness may be reduced.
12. **Movement in Soil:** Liberty breaks down rapidly in the soil, which will effectively limit soil movement.
13. **Cropping Restrictions:** Do not graze treated crop until 20 days after application. Grain corn pre-harvest interval = 86 days.
14. **Toxicity:** Acute oral LD₅₀: male rats = 2,170 mg/kg; female rats = 1,910 mg/kg. Moderate dermal irritant. No allergic potential.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Do not store below freezing. If stored for one year or longer, shake well before using.
17. **Resistance Management:** See page 41 for information on resistance management.

Lontrel (clopyralid)

Group 4

Manufacturer: Dow AgroSciences Canada Inc.



Caution Poison

1. **Formulations:** Solution; 360 g/L (PCP# 23545); 4.45 L jug.
2. **Registered Mixes:** **Canola:** Poast Ultra; **Flax:** MCPA (Amine or Ester), Poast Ultra, Poast Ultra + MCPA (Amine), Fusion, Select; **Oats:** MCPA (Amine or Ester); **Wheat and barley:** 2,4-D or MCPA (Amine or Ester), Refine Extra + MCPA Ester 500, Refine Extra + 2,4-D Ester 600. **Clearfield Canola:** Odyssey; **Glyphosate Tolerant Canola:** Roundup Original/Transorb, Vantage Plus.
Mixing restrictions: Add 1/2 amount of water to tank, add Lontrel, add more water, add other herbicide, then add remaining amount of water. **Mix order with Refine Extra or Odyssey:** Add Refine Extra or Odyssey herbicide, then Lontrel, then other herbicides, surfactant last.

Safety information, see page 25

Lontrel (cont'd)

3. Crops:

altari wild rye	flax	oats	sugar beets
barley	intermediate wheatgrass	orchard grass	summerfallow
cabbage	Kentucky bluegrass	reed canary grass	tall fescue
canola	meadow fescue	Russian wild rye	tall wheatgrass*
creeping red fescue	meadow foxtail	slender wheatgrass	timothy
crested wheatgrass	non-crop farmland	smooth brome grass	wheat

* Forage production only.

Underseeding: Not recommended for forage legumes.

4. Weeds Controlled: Alsike clover, Canada thistle (7.2), common groundsel, golden rod, perennial sow thistle (7.0) (top growth control), scentless chamomile, tufted vetch, volunteer alfalfa, wild buckwheat (6.5).

5. Weeds Suppressed: Canada thistle (top control only at 170 mL/ac rate), ox-eye daisy, sorrel.

6. When Used:

Crop stage: Canola: 2 - 6 leaf stage. **Flax:** 5 - 10 cm high. **Forage grasses:** Seedling: 2 - 4 leaf stage. Established: Shot blade or in fall after harvest or early spring. **Sugar beets:** Cotyledon to 8 leaf stage.

Wheat, barley and oats: 3 leaf to flag leaf stages. When tank mixed with 2,4-D or MCPA, observe timing on their respective labels.

Weed stage: Canada thistle: rosette to prebud stage and actively growing; other susceptible weeds at appropriate seedling stage and actively growing.

7. How to Apply:

With: Ground equipment.

Rate:

Crop	Rate	Weeds controlled
Barley, oats, wheat	113 mL/ac + MCPA or 2,4-D Amine or Ester	Canada thistle (top growth; 6 - 8 weeks) + MCPA or 2,4-D susceptible weeds.
	170 mL/ac + MCPA or 2,4-D Amine or Ester	Canada thistle (season-long control) + MCPA or 2,4-D susceptible weeds.
	85 mL/ac + 8 g/ac Refine Extra + 340 mL/ac MCPA Ester 500**	Lady's-thumb, perennial sow thistle (top growth control), stinkweed, volunteer canola, wild buckwheat, wild mustard. Seasonal control of Canada thistle and suppression of cleavers.
	or	Note: Refer to MCPA or 2,4-D Ester labels for additional weeds.
	85 mL/ac + 8 g/ac Refine Extra + 283 mL/ac 2,4-D Ester 600**	
	170 mL/ac	Canada thistle (top growth; 6 - 8 weeks).
	227 mL/ac	Canada thistle (season-long control).

* Do not apply 2,4-D on oats due to probability of crop injury.

** Do not use these tank mixes on oats. Mix order: Refine Extra, then Lontrel, then MCPA or 2,4-D, then surfactant. When tank mixing with 2,4-D or MCPA, refer to rate and weeds controlled on respective labels.

Cabbage	202 mL/ac in 120 L/ac water volume	
Canola (seedling and established),	170 mL/ac	Canada thistle (top growth control) for 6 - 8 weeks.
grasses, non-crop farmland and	227 mL/ac	Canada thistle (season-long control), common groundsel, perennial sow thistle (top growth control), scentless chamomile, wild buckwheat.
summerfallow*	336 mL/ac	Canada thistle (season-long control and suppression into following season), common groundsel, perennial sow thistle (top growth control), scentless chamomile, wild buckwheat.

* On non-crop farmland and summerfallow, 336 mL/ac rate only.

continued

Lontrel (cont'd)

continued

Crop	Rate	Weeds controlled
Clearfield canola	170 mL/ac + Odyssey 227 mL/ac + Odyssey	Canada thistle top growth (6 - 8 weeks). Canada thistle (season-long control). Note: See Odyssey label for other weeds controlled.
Glyphosate tolerant canola	113 mL/ac + 506 mL/ac Roundup Original, Transorb, Vantage or Vantage Plus	Season-long top growth control of Canada thistle, dandelions and perennial sowthistle <15 cm. Control of wild buckwheat. Suppression of dandelion >15 cm. Note: See Roundup Original, Roundup Transorb, Vantage/Vantage Plus labels for other weeds controlled.
Flax	170 mL/ac + MCPA Amine or Ester 227 mL/ac 336 mL/ac	Canada thistle (top growth control) + MCPA susceptible weeds. Canada thistle (season-long control), common groundsel, perennial sow thistle (top growth control), scentless chamomile, wild buckwheat. Canada thistle (season-long control and suppression into the following year), common groundsel, perennial sow thistle (top growth control), scentless chamomile, wild buckwheat.
Sugar beets	227 - 336 mL/ac	Canada thistle.
Renovation one application per year	336 mL/ac	Canada thistle (season-long and suppression into the following year), ox-eye daisy, sheep sorrel, tufted vetch.

Water volume: 40 - 80 L/ac.

Pressure: 200 - 275 kPa.

Nozzles: Flat fan nozzles preferred.

- 8. Application Tips:** Do not use products containing 2,4-D on oats due to probability of crop injury. Rates of MCPA Ester of 170 g active ingredients/ac or higher, or MCPA Amine of 200 g active ingredient/ac may cause some delay in maturity of flax resulting in yield reduction. Make sure the sprayer tank has been thoroughly cleaned before Lontrel is mixed. Treat crops during warm weather when weeds are actively growing. Best results are obtained when Canada thistle is actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of Canada thistle may be severely reduced. sow thistle plants emerging after spraying will not be controlled. Where contact herbicides are used, such as bromoxymil, that damage the leaves of the Canada thistle, apply Lontrel 14 days prior or after an interval of 14 days, which allows Canada thistle to recover and resume growth.

Forage grasses: For control of the weeds listed on the label plus alsike clover, apply Lontrel at the rate of 170 - 336 mL/ac in 45 - 90 L/ac of water. Make one application per season by ground sprayer. For seedling grasses, apply at the 3 leaf stage and beyond. For established grasses, apply in the fall after harvest or early spring.

- 9. How it Works:** Clopyralid is a systemic, hormone-type herbicide. It is absorbed by leaf and stem surfaces and is readily translocated. Maximum efficacy results from foliar application to young actively growing plants.
- 10. Expected Results:** Herbicide symptoms on affected plants include swollen growing points and roots, cupping of leaves, twisted and distorted stems and leaves. Plants will gradually stop growing and change colour, first to dark green and then to yellow before turning brown as they die. Maximum effectiveness results from foliar applications to young actively growing plants. Death of weeds may not occur until 14 - 21 days after application. With the lowest rate of Lontrel on Canada thistle, some regrowth may occur by the end of the season, but this will not interfere with harvesting of the crop.

Lontrel (cont'd)

- 11. Effects of Rainfall:** A rain-free period of 4 - 6 hours is required.
- 12. Movement in Soil:** Clopyralid is somewhat soluble in water but is generally not mobile in soil under typical prairie conditions.

13. Cropping Restrictions:

Drift: Small amounts of drift may damage sensitive plants such as legumes.

Succeeding crops: Fields treated with Lontrel can be seeded to barley, canola, forage grasses, flax, mustard, oats, rye, wheat or summerfallowed. Do not seed to crops other than those listed above for at least one year after treatment.

Use of straw and manure from treated crops: Lontrel residues in straw may be harmful to susceptible plants. Do not use straw from treated crops for composting or mulching on susceptible broadleaf crops. Manure can be spread on fields that will be seeded to barley, flax, oats, canola (rapeseed), rye or wheat. Do not grow susceptible crops such as peas, beans, lentils, potatoes, sunflowers or other sensitive crops on land that has been mulched with straw containing Lontrel 360 residues within the last 12 months.

Grazing restrictions: Crops or areas treated with this product may be grazed immediately following treatment. Sugar beets – Do not apply within 90 days of harvest. Strawberry – P.H.I. = 200 days.

Other restrictions: Sugar beet pre-harvest interval is 90 days. Strawberry pre-harvest interval is 200 days.

- 14. Toxicity:** Very low acute mammalian toxicity. Acute oral LC_{50} (rats) = $>2,000$ mg/kg. Acute oral LD_{50} (bees) = >100 μ g/bee. Extremely low toxicity to fish.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Store away from food, feedstuffs, fertilizer, seeds, insecticides, fungicides or other pesticides. Store in heated storage away from open flames or sparks. If frozen, warm slowly to room temperature and mix thoroughly before use.
- 17. Resistance Management:** See page 41 for information on resistance management.

Lorox/Linuron (linuron)

Group 7

Manufacturer: Tessenderlo Kerley Inc./United Agri Products Canada Inc.

- 1. Formulations: Lorox DF:** Dry flowable; 50% (PCP# 20193); 5.0, 10.0 kg jug. Dry flowable; Toss-N-Go water soluble pouches; 50% (PCP# 21353); 2.0, 2.5 kg bag.
- Lorox L:** Liquid; 480g/L (PCP# 16279); 10L jug. **Linuron 400:** 400 g/L (PCP# 15544); 10 L jug.
- 2. Registered Mixes:** Estemine MCPA, MCPA Amine 500 (barley, oats, spring wheat); MCPA K-salt (barley, spring wheat); Target (refer to Target label for application rates) (barley, durum wheat, spring wheat). Lorox L + Atrazine 80 WG.

Mix instructions:

1. Fill tank with 1/4 required amount of water.
2. Turn on full agitation.
3. Add the required number of Lorox DF Toss-N-Go pouches. Maintain full agitation until pouches are completely dissolved and product is fully dispersed.
4. Continue filling tank with water and add tank mix partners (if applicable) in the following sequence:
 - dry formulations,
 - liquid formulations,
 - emulsifiable concentrates and surfactants.
5. Continue with full agitation.
6. On repeat tank loads, ensure that the amount of spray solution left in the tank from the previous load is less than 10% of the volume to be mixed.

Safety information, see page 25

3. Crops:**Lorox/Linuron 480**

apple	cherry	established fruit trees*	plum
asparagus (8.7)	Coriander ¹	established shelterbelts**	potatoes (8.7)
caraway ¹	dill ¹	field corn (6.5)	short rotation hybrid poplar
carrots (8.2)		pear	

¹ Lorox L only.**Lorox/Linuron 480 + MCPA Amine 500 (on cereals, do not use Lorox/Linuron alone)**

barley (8.6)	durum wheat (8.2)	oats (8.9)	spring wheat (8.2)
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Lorox DF

carrots (8.2)	potatoes (8.7)	soybeans
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"established" = stock established at least 1 year.

* Apple, cherry, pear, plum.

** American elm, caragana, Colorado spruce, green ash, Manitoba maple, poplar, Scotch pine, Siberian elm, white spruce, willow.

4. Weeds Controlled:**Lorox/Linuron 480 (in crops other than cereals greater than 400 g/ac)**

annual sow thistle	knotweed	redroot pigweed (7.9)	stinkweed (8.5)
barnyard grass (8.3)	lamb's-quarters (7.9)	shepherd's-purse	wild buckwheat (8.5)
common chickweed (9.0)	purslane (8.4)	smartweeds (9.0)	wormseed mustard (8.9)
goosefoot (8.4)	ragweed		

Lorox/Linuron 480 + MCPA Amine 500 (in cereals 210 g/ac)

common chickweed (7.4)	hemp-nettle (7.5)	shepherd's-purse	stork's-bill
corn spurry	lamb's-quarters (8.9)	smartweeds (7.0)	tartary buckwheat (7.9)
cow cockle (6.8)	ragweed	stinkweed (8.9)	wild buckwheat (7.5)
flixweed	redroot pigweed (7.8)		

Underseeding: Forages not recommended.**5. Weeds Suppressed:****Lorox/Linuron:** Green foxtail (6.7), yellow foxtail.**Lorox/Linuron + MCPA:** Canada thistle (4.7), green foxtail, yellow foxtail.**6. When Used:****Crop stage:****Asparagus:** Immediately after disking, before crop emergence; may be repeated after last cutting.**Carrots:** Pre-emergent; after planting (at least 1 cm deep) but before crop emergence. Post-emergent; 2 or more fully developed true leaves (8 - 15 cm tall). Before annual grasses 5 cm tall, broadleaf weeds 15 cm tall. Pre- + post-emergent; observe limitations of pre- and post-emergent treatments. To prevent crop injury, treatments must be at least 2 weeks apart.**Cereals:** 2 - 4 leaf. Must be tank mixed with MCPA Amine when applying on wheat, oats and barley or MCPA K-salt when applying to wheat and barley. **Do not use Lorox/Linuron alone on cereals.****Corn:** Lorox L; post-emergent, after corn is at least 38 cm tall, directed spray. Atrazine 80W mix; pre-emergent, after planting at least 5 cm deep but before crop emergence. Do not spray over top of corn.**Potatoes:** Pre-emergent; after planting (at least 5 cm deep) but before crop emergence. Before grassy weeds 5 cm tall, broadleaf weeds 15 cm tall. Treat after final hilling operation.**Chemical fallow:** Sweep + MCPA mix; when broadleaf weeds small and actively growing, annual grasses 2 - 4 leaf. Only one application per season. Apply only in spring.**Fruit trees (established at least 10 years, peach 1 year):** Directed spray under trees and bushes before buds open and before weeds 10 cm tall.**Shelterbelts (established):** Stock planted for at least 1 year; directed spray **under trees** and bushes before buds open in spring, before weeds 10 cm tall.**Weed stage:** Annual broadleaf weeds - 2 to 4 leaf stage; green foxtail: 1 - 3 leaf stage.

Safety information, see page 25

Lorox/Linuron (cont'd)**7. How to Apply:****With:** Aircraft or ground equipment.**Rate:**

Crop	Time (crop)	Lorox L (L/ac)	Linuron 400 (L/ac)	Tank mix
Asparagus	Pre-emergent	1.4 - 1.8		NA*
Barley, oats, spring wheat	2 - 4 leaf	0.17 - 0.22	0.21 - 0.27	MCPA Amine 500; 345 - 445 mL/ac
Barley, spring wheat	2 - 4 leaf	0.17 - 0.22		MCPA K-salt; 405 - 567 mL/ac
Carrots	Pre-emergent	0.45 - 1.37		NA
	Post-emergent	0.91 - 1.82	1.09 - 1.58	NA
	Pre + post-emergent	0.45 - 0.91	0.91 - 1.82	NA
Corn (2% or less soil O.M.) (2 - 5% soil O.M.)	Pre-emergent	0.91	1.09	Atrazine 80W; 610 g/ac
	Pre-emergent	1.3	1.58	Atrazine 80W; 910 g/ac
	Post-emergent	0.97 - 1.82	1.17 - 1.19	Oil - water emulsion
Fruit trees	Spring	3.6	4.37	Surfactant
Potatoes	Pre-emergent	0.91 - 1.82	1.11 - 2.23	NA
Saskatoons	Fall/early spring		2.02 - 3.04	As directed on label
Shelterbelts (established)	Spring	1.82		NA

* NA - Not Applicable.

Crop	Time (crop)	Lorox DF (kg/ac)	Tank mix
Barley, oats, spring wheat	Post-emergent	0.16 - 0.21	MCPA Amine 500; 345 - 445 mL/ac
Barley, spring wheat	Post-emergent	0.16 - 0.21	MCPA K-salt; 405 - 567 mL/ac
Carrots	Pre-emergent	0.4 - 1.3	
	Post-emergent	0.9 - 1.8	
	Pre + post-emergent	0.4 - 0.9; 0.9 - 1.8	
Potatoes	Pre-emergent	0.9 - 1.8 kg/ac	

Water volume: Asparagus, potatoes: 120 L/ac. Carrots: 90 - 135 L/ac. Cereals: 40 L/ac minimum. Corn: pre-emergent 90 - 135 L/ac; post-emergent 70 - 140 L/ac. Fruit trees: 160 - 240 L/ac.

Pressure: 275 kPa.

Nozzles: Flat fan recommended. 50 mesh line strainers and screens.

Incorporation: Not applicable.

Must be tank mixed with MCPA Amine when applying to wheat, oats and barley or MCPA K-salt when applying to wheat and barley.

8. Application Tips: Do not use on sandy or coarse-textured soils, low in organic matter, as crop injury may result. Do not use when crops are under drought stress. Fruit trees: avoid contact with fruit, foliage and green bark with spray or drift as injury may result.

9. How it Works: A systemic herbicide absorbed by leaves and roots. Yellowing (chlorosis), stunting and finally death occurs 10 - 14 days after treatment.

10. Expected Results:

Weeds: Yellowing starts 7 - 10 days after application. Effect greatest under excellent growing conditions. Weed control will vary depending on species, time of application and growing conditions.

Crop: A slight yellowing of crop, leaf tip and leaf margin burn may be seen 7 - 10 days after application. Crop recovers within 14 - 18 days. Crop injury can occur if applied during period of high heat.

11. Effects of Rainfall: Heavy rainfall within 2 hours may decrease activity. Pre-emergent treatment requires rainfall or irrigation for activation. Carrots, corn or potatoes may be severely injured if unusually heavy rains follow application.

12. Movement in Soil: Movement by leaching is least in soils high in clay and/or organic matter; greatest in sand.

Safety information, see page 25

- 13. Cropping Restrictions:** Do not apply post-emergent corn treatment within 60 days of harvest. 25% carryover into next growing season if rates are 1.8 L/ac or higher.
- Grazing restrictions:** Do not graze or cut for hay; there are not sufficient data available to support such use.
- 14. Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = technical 4,000 mg/kg. Very toxic to fish. Non-toxic to bees.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Lorox L/Linuron: Store in a heated area. Do not freeze as settling may occur. If frozen, thoroughly mix to resuspend. Lorox DF: Store in a dry place.
- 17. Resistance Management:** See page 41 for information on resistance management.



Warning Poison

MCPA (amine, ester, potassium salt and sodium salt)

Manufacturers: various

Group 4

Formulations

Product	Company	Active ingredient	Formulation	Container size
MCPA 500 amine (PCP# 20308)	IPCO	500 g/L	Solution	2 x 10 L jugs
MCPA 500 amine (PCP# 9516)	UAP	500 g/L	Solution	2 x 10 L jugs
MCPA 600 amine (PCP# 28384)	Nufarm	600 g/L	Solution	2 x 10 L jugs
MCPA 500 amine (PCP# 29244)	Viterra	500 g/L	Solution	2 x 10 L jugs
MCPA 600 ester (PCP# 27802)	IPCO	600 g/L	EC	2 x 10 L jugs
MCPA 600 ester (PCP# 27803)	Nufarm	600 g/L	EC	2 x 10 L jugs
MCPA 600 ester (PCP# 27804)	UAP	600 g/L	EC	2 x 10 L jugs
MCPA 600 ester (PCP# 29001)	Viterra	600 g/L	EC	2 x 10 L jugs
MCPA 400 Potassium salt (PCP# 20305)	IPCO	400 g/L	Solution	2 x 10 L jugs
MCPA 400 Potassium salt (PCP# 14188)	UAP	400 g/L	Solution	2 x 10 L jugs
MCPA 300 Sodium salt (PCP# 20306)	IPCO	300 g/L	Solution	2 x 10 L jugs
MCPA 300 Sodium salt (PCP# 14718)	Nufarm	300 g/L	Solution	2 x 10 L, 20 L jugs
MCPA 300 Sodium salt (PCP# 9858)	UAP	300 g/L	Solution	2 x 10 L jugs

Crops, Staging and Rates

Crop	Stage	Rate
Wheat (spring and durum), barley, spring rye	From the 3-leaf expanded to the early flag-leaf (shot blade) stage.	500 amine: 0.45 L/acre 600 amine or ester: 0.42 L/acre 400 K salt: 0.53 L/acre 300 Na salt: 0.81 L/acre
Oats	From the 3 leaf to early flag leaf	500 amine or ester: 0.45 L/acre 600 amine or ester: 0.36 L/acre 400 K salt: 0.53 L/acre 300 Na salt: 0.81 L/acre
Winter wheat (WW) and fall rye (FR)	Spring: from the time growth commences until flag leaf stage	500 amine: 0.45 L/acre 600 ester: 0.42 L/acre 400 K salt: WW 0.61 L/acre, FR 0.40 L/acre 300 Na salt: 0.81 L/acre
Flax (excluding solin)	5 cm in height to pre-bud stage. Apply at 5 – 10 cm in height for maximum crop tolerance	500 amine: 0.4 L/acre 600 amine: 0.34 L/acre; 600 ester: 0.28 L/acre 400 K salt: 0.65 L/acre 300 Na salt: 0.71 L/acre
Corn	As a broadcast spray up to 15 – 18 cm tall or 6-leaf stage. Directed spray using drop nozzles: up to 3 wks. before tassling.	500 amine or ester: 0.45 L/acre 600 amine only: 0.37 L/acre 400 K salt: 0.51 L/acre 300 Na salt: 0.61 L/acre

MCPA (cont'd)

Crop	Stage	Rate	
Peas (field and canning)	Vine 10 – 18 cm long. For short stature determinate varieties apply at the early stage within this range.	500 amine or ester: 0.135 – 0.22 L/acre 600 amine only: 0.17 L/acre	400 K salt: not registered 300 Na salt: 0.36 L/acre
Forages (established)	Apply in the spring up to the shot blade stage	500 amine only: 0.45 L/acre	
Seedling forage (no for grass production)	From the 3 leaf to early flag leaf	500 amine only: 0.45 L/acre	
Pasture, rangeland, turf	Spring or fall	500 amine or ester: 1.41 L/acre	600 amine: 1.41 L/acre; 600 ester: 1.13 L/acre
Red clover (seedling and established)	Seedling: 1 – 3 trifoliate stage Established: breaking of dormancy in the spring up to 7.5 cm	500 amine: 0.23 L/acre 600 amine only: 0.19 L/acre	400 K salt: not registered 300 Na salt: 0.36 L/acre
Cereals underseeded to alfalfa (not Flemish)	Apply when alfalfa is in the 1 – 3 trifoliate stage	500 amine: 0.23 L/acre 600 amine only: 0.19 L/acre	400 K salt: not registered 300 Na salt: 0.4 L/acre
Cereals underseeded to alsike, ladino and red clover	Apply when clover is in the 1 – 3 trifoliate stage	500 amine: 0.28 L/acre 600 amine or ester: not registered	400 K salt: not registered 300 Na salt: 0.4 L/acre
Fairway and lawns	Apply early in the summer	500 amine: 0.4 – 1.0 L/acre 600 amine or ester: not registered	400 K salt: not registered 300 Na salt: 0.4 L/acre

Weeds, Rate and Staging

Apply at lower rates when weeds are small (2- to 4-leaf), growing rapidly, under good growing conditions. Higher rates are needed when weeds are larger, growing under stress conditions (dry or cold weather) or in heavy infestation.

Susceptible Weeds

MCPA 500 amine: Small weeds, good growing conditions: 0.28 L/acre. Weeds in dry or cool conditions, heavy infestation: 0.45 L/acre

MCPA 600 amine or ester: Small weeds, good growing conditions: 0.24 L/acre. Weeds in dry or cool conditions, heavy infestation: 0.36 L/acre

MCPA 400 K salt: Small weeds, good growing conditions: 0.61 L/acre. Weeds in dry or cool conditions, heavy infestation: 0.71 L/acre

MCPA 300 Na salt: Small weeds, good growing conditions: 0.50 L/acre. Weeds in dry or cool conditions, heavy infestation: 0.81 L/acre

burdock (before the 4-leaf stage)	Indian mustard (8.2)	ragweed	wild radish
cocklebur	kochia (5.9) (7.3)	Russian pigweed (7.0)	wild mustard (8.5)
flixweed (seedlings) (7.1)	lamb's-quarters (7.2)	shepherd's-purse	wormseed mustard (8.3)
	prickly lettuce	stinkweed (8.3)	wild sunflower

Harder-to-kill Weeds

MCPA 500 amine: Small weeds, good growing conditions: 0.45 L/acre. Weeds in dry or cool conditions, heavy infestation: 0.71 L/acre

MCPA 600 amine or ester: Small weeds, good growing conditions: 0.42 L/acre. Weeds in dry or cool conditions, heavy infestation: 0.61 L/acre

MCPA 400 K salt: Small weeds, good growing conditions: 0.71 L/acre. Weeds in dry or cool conditions, heavy infestation: 0.81 L/acre

MCPA 300 Na salt: Small weeds, good growing conditions: 0.81 L/acre. Weeds in dry or cool conditions, heavy infestation: 1.1 L/acre

annual sow-thistle*	daisy fleabane	goosefoot*	redroot pigweed
biannual wormwood*	dog mustard	hemp-nettle (4.2) -	sweet clover (seedlings)
bluebur*	flixweed (over-winter rosettes) *	suppression	tansey mustard
common peppergrass*	field peppergrass	hairy galinsoga	tartary buckwheat
curled dock	goat's-beard*	kochia	

Top Growth Control Only

MCPA 500 amine: Small weeds, good growing conditions: 0.45 L/acre. Weeds in dry or cool conditions, heavy infestation: 0.71 L/acre

Safety information, see page 25

MCPA (cont'd)

MCPA 600 amine or ester: Small weeds, good growing conditions: 0.42 L/acre. Weeds in dry or cool conditions, heavy infestation: 0.61 L/acre

MCPA 400 K salt: Small weeds, good growing conditions: 0.71 L/acre. Weeds in dry or cool conditions, heavy infestation: 0.81 L/acre

MCPA 300 Na salt: Small weeds, good growing conditions: 0.81 L/acre. Weeds in dry or cool conditions, heavy infestation: 1.1 L/acre

blue lettuce*
Canada thistle (5.8)
corn spurry**
dandelions**

gumweed*
field bindweed*
field horsetail**
hedge bindweed*

hoary cress*
leafy spurge*
mouse-eared chickweed
perennial sow-thistle*

Russian thistle**
wild buckwheat* (3.6)

* Not controlled by MCPA K formulation

** Not controlled by MCPA Na formulation

Tank Mixtures

Barley

MCPA 500 amine (400 mL/acre) + Sencor (111 – 202 mL/acre)

MCPA 500 amine (344 mL/acre) + Banvel (93 mL/acre)

MCPA K-salt (404 mL/acre) + Banvel II (92 mL/acre)

MCPA K-salt (270 – 550 mL/acre) + Pardner (404 mL/acre)

Wheat

MCPA 500 amine (400 mL/acre) + Sencor (111 – 172 mL/acre)

MCPA 500 amine (344 mL/acre) + Banvel (93 mL/acre)

MCPA K-salt (404 mL/acre) + 117 mL/acre)

MCPA K-salt (270 – 550 mL/acre) + Pardner (404 mL/acre). Note: Do not exceed 270 mL/acre rate of MCPA K-salt in winter wheat using this tank mixture.

Oats

MCPA K-salt (270 – 550 mL/acre) + Pardner (404 mL/acre)

Cereals underseeded to alfalfa and bird's-foot trefoil

MCPA 500 amine (28 mL/acre) + Embutox (505 mL/acre)

Application Information

How to Apply: Ground and air.

Water Volume: Cereals, flax, pastures, forage grasses: 40 L/acre; Peas: minimum of 61 L/acre; Pasture, rangeland and turf: 180 L/acre; Cereals underseeded to legumes: 61 – 81 L/acre

Nozzles: Flat fan is recommended. **Pressure:** Air: 235 kPa or less; **Ground:** 200 – 275 kPa.

Application Tips

Best weed control occurs when daytime temperatures are above 21°C and nighttime temperatures are at 10°C. Do not spray when air temperature is above 27°C. Extremely hard water may reduce performance. When applying to flax under hot and humid conditions, some crop injury and delay in maturity may result. Spraying in the evening and/or increased volumes of water (40 or more litres per acre) may reduce the risk of flax injury.

How it works

A systemic, absorbed by leaf and stem surfaces and translocated to the actively growing regions. MCPA disrupt cell division, causing abnormal growth response, thereby effecting respiration and food reserves.

Expected Results

Weeds start to twist between 2 – 20 days after spraying, depending on weather conditions, formulation and nature of weeds. Following the twisting and bending, plants will turn brown, and then die. Only emerged weeds will be controlled.

Restrictions

Effect of Rainfall: Rain within 6 hrs of MCPA Na salt, or MCPA K-salt, 4 hrs of MCPA amine, and 2 hrs of MCPA ester application will decrease weed control.

Grazing: Do not graze or cut for green feed until 7 days after spraying.

Re-cropping: No restrictions the year after application.

Safety information, see page 25

MCPA (cont'd)**Environmental Hazards**

MCPA is toxic to aquatic organisms and non-target terrestrial plants. **Leaching:** MCPA can readily leached from soil, resulting in contamination of groundwater particularly in areas where soils are permeable (e.g. sand, loamy sand and sand loam soils) and/or the depth to the water table is shallow.

Toxicity

Moderate acute mammalian toxicity. May cause burn upon contact with skin and eyes, and it can be absorbed through the skin and it can be absorbed through the skin.

Storage

If frozen, warm to 5°C and mix well before using.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.

Mecoprop-P/Compitox (mecoprop)

Group 4

Manufacturer: Nufarm Agriculture Inc./United Agri Products Canada Inc.



Caution Poison

1. **Formulations:** Liquid; **Compitox:** 150 g/L (PCP# 27824); 4 L, 8 L containers.
Mecoprop-P: 150 g/L (PCP# 27891); 10 L containers.
2. **Registered Mixes:** MCPA for turf only, Dicamba.
3. **Crops:** Barley (9.0), durum wheat (8.7), lawns, oats, spring wheat (8.7), turf.
Underseeding: Not recommended.
4. **Weeds Controlled:**

black medic (Mecoprop only)	cleavers	lamb's-quarters	volunteer clover
buttercup	corn spurry (7.3)	plantain	wild mustard
chickweed (7.6)	ground-ivy		
5. **Weeds Suppressed:** Canada thistle (top growth control) (4.6).
6. **When Used:**

Crop stage: 3 leaf to early flag leaf.

Weed stage: 2 - 4 leaf and mature plants.
7. **How to Apply:**

With: Ground equipment.

Rate: Cereals: 2.2 - 2.8 L/ac. Lawns, turf: 2.2 - 3.4 L/ac. Low rate for seedling weeds. High rate for mature weeds.

Water volume: Cereals: 80 - 120 L/ac. Lawns, turf: 80 - 160 L/ac.

Pressure: 300 kPa.

Nozzles: Flat fan recommended.
8. **Application Tips:** Recommended water volume is essential for optimum weed control. Cold weather and drought may cause a delay in weed control action. Do not spray bentgrass when temperatures are above 27°C, particularly if high rates are used.
9. **How it Works:** A systemic that disrupts the plant's translocation system causing the accumulation of plant food in the shoots and subsequent starvation of the roots.
10. **Expected Results:**

Weeds: Leaf curling and stem twisting should be visible within 4 - 5 days after spraying. Weeds should be dead within 3 - 4 weeks of application.

Safety information, see page 25

Crop: Deformed heads, missing florets and twisted awns could result if recommendations are not followed or if crop is under stress conditions.

11. Effects of Rainfall: Rain within 4 - 6 hours will reduce effectiveness.

12. Movement in Soil: Readily leached from soils. Longer residual in dry soil.

13. Cropping Restrictions:

Succeeding crops: No restrictions.

Drift: Danger of vapour drift is low.

Grazing restrictions: Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.

14. Toxicity: Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = 1,060 mg/kg.

15. Precautions, First Aid: Check label for first aid information.

16. Storage: Store above 0°C. If stored for 1 year or longer, shake well before using.

17. Resistance Management: See page 41 for information on resistance management.

Muster (ethametsulfuron methyl)

Group 2

Manufacturer: E.I. duPont Canada Co.



Caution Poison

1. Formulations: Dry flowable; 75%; Toss-N-Go 320 grams (PCP# 23569); (4 x 80 g) water soluble pouches.

2. Registered Mixes: Assure II, Poast Ultra.

Surfactants: Agral 90, Ag-Surf, Citowett Plus, Super Spreader.

Mixing instructions: Use mixing instructions "b" on page 12.

3. Crops: Canola (spring), condiment mustard (Brown and Oriental mustards only), sunflower.

4. Weeds Controlled:

Muster 8 g/ac

flixweed (spring seedlings) (8.3)

green smartweed (7.3)

hemp-nettle (8.1)

wild mustard (8.0)

Muster 12 g/ac

flixweed

hemp-nettle

green smartweed (7.7)

stinkweed (7.9*)

wild mustard

* Controlled at 8 g/ac of Muster when tank mixed with Assure II + Sure-Mix or Poast Ultra + Merge.

5. Weeds Suppressed:

Muster 8 g/ac stinkweed (7.1)

Muster 12 g/ac redroot pigweed (7.0)

6. When Used:

Crop stage: Canola: 2 leaf to the beginning of bolting. Condiment mustards: 4 leaf to late rosette stage. Sunflower: 1 - 6 leaf stage.

Weed stage: Cotyledon to 6 leaf stage of the target weeds. Stinkweed: 1 - 4 leaf stage and actively growing.

7. How to Apply:

With: Ground equipment only. Do not apply by air.

Rate:

Muster alone: 8 - 12 g/ac (apply with 2.0 L of surfactant in 1,000 L of spray volume). Not more than 8 g/ac on Brown or Oriental mustards.

Muster + Assure II: 8 - 12 g/ac + 0.15 - 0.2 L/ac + 5 L/1,000 L Sure-Mix. Do not apply in combination with other pesticides.

Safety information, see page 25

Muster (cont'd)

Muster + Poast Ultra: 8 - 12 g/ac + 130 - 190 mL/ac. (Use surfactant as outlined on Poast Ultra label).

Water volume: 40 L/ac.

Pressure: 210 - 275 kPa.

Nozzle: Flat fan recommended. Use 50 mesh screens or larger (metal or nylon).

Sprayer cleanup: To avoid injury to susceptible crops, thoroughly clean sprayer immediately after spraying. Ammonia must be used to deactivate Muster when cleaning equipment. Use cleanup method A on page 16.

8. **Application Tips:** For optimum weed control, apply Muster at the cotyledon to 6 leaf stage of the target weeds. For best control of stinkweed, apply Muster plus surfactant on actively growing emerged stinkweed in the 1 - 4 leaf stage. When very high weed seedling population occurs, larger seedlings may interfere with coverage of smaller seedlings and control may be reduced. Regrowth may also occur if crop competitiveness is reduced by thin stands and/or reduced vigour.
9. **How it Works:** Absorbed by foliage and roots. Inhibits cell elongation.
10. **Expected Results:** Weed growth stops almost immediately. Poor results may be expected if improper mixing, timing or coverage, or when weeds are under drought stress or moisture stress.
11. **Effects of Rainfall:** If rain occurs soon after application, control may be reduced. 4 - 6 hours of dry weather are needed to allow Muster to be absorbed by weed foliage. Environmental conditions that slow the drying of Muster on the foliage, such as high relative humidity, cool air temperature or cloud cover, may increase the time required.
12. **Movement in Soil:** Movement is restricted by finely textured soils, soil organic matter and neutral-to-acidic conditions.
13. **Cropping Restrictions:**

Minimum crop rotation guidelines: Minimum interval is that from the last application of Muster to date of planting the rotational crop.

Interval prior to planting (months after application): 10 months - spring wheat, durum wheat, barley, flax, oats. 22 months - alfalfa, canary grass, canola, drybeans, fababeans, fescue, lentils, peas, red clover, tame mustard. All other crops, field bioassay at 22 months.

Grazing restrictions: Do not graze or feed crop to livestock within 60 days of treatment. Do not harvest within 60 days of treatment.

* Wherever Muster is used on land previously treated with Ally herbicide, read the rotational guidelines on both labels and follow the label with the longest interval stated for your situation.
14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = >5,000 mg/kg.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Store in a cool, dry place.
17. **Resistance Management:** See page 41 for information on resistance management.

Muster Gold II *(quizalofop-p-ethyl + ethametsulfuron methyl)*

Manufacturer: E.I. duPont Canada Co.

Group 1,2



Caution Poison

1. Formulations:

Muster: Dry flowable; 75% (PCP# 21555); 320 g. (4 x 80 g) water soluble pouches.

Assure II: Emulsifiable concentrate; 96 g/L (PCP# 25462); 1 x 8 L. + 1 jug Merge (adjuvant).

Safety information, see page 25

2. **Registered Mixes:** None.

3. **Crops:** Canola (spring). **Do not use on yellow mustard.**

4. **Weeds Controlled:**

barnyard grass	green smartweed	volunteer barley	wild mustard
flixweed (spring seedlings)	hemp-nettle	volunteer wheat	wild oats
green foxtail	stinkweed		

5. **Weeds Suppressed:** Quackgrass at 200 mL/ac rate.

6. **When Used:**

Crop stage: 2 leaf to the beginning of bolting.

Weed stage: Annual grasses: 2 leaf to early tillering stage. Wild oats: prior to tillering.

Quackgrass: 2 - 6 leaf stage. Broadleaf weeds: cotyledon to 6 leaf stage. Stinkweed: 1 - 4 leaf stage and actively growing.

7. **How to Apply:**

With: Ground equipment only. Do not apply by air.

Rate: Assure II 200 mL/ac + Muster 8 g/ac plus 5 L of Merge per 1,000 litres spray solution.

Water volume: Minimum of 40 L/ac.

Pressure: 210 - 275 kPa.

Nozzles: Use flat fan nozzles. Do not use flood jet nozzles. Use 50 mesh screens or larger.

Mixing instructions: Use mixing instructions "b" on page 12.

Sprayer cleanup: Use cleanup method A on page 16

8. **Application Tips:** Best results on wild oats if application is made prior to tillering. For optimum control, apply Muster Gold II at the cotyledon to 6 leaf stage of the target broadleaf weeds. For stinkweed, apply Muster Gold II when actively growing: 1 - 4 leaf stage. When very high weed seedling population occurs, larger seedlings may interfere with coverage of smaller seedlings, and control may be reduced. Regrowth may also occur if crop competitiveness is reduced by thin stands and/or reduced vigour. Do not apply Muster Gold II to plants stressed by severe conditions such as drought, low fertility, saline soils, waterlogged soils, disease or insect damage as crop injury may result.

9. **How it Works:** Assure II is a systemic herbicide that is rapidly absorbed and readily translocated from the treated foliage to the root system and growing points of the plant. Muster is absorbed by the foliage and roots. Inhibits cell elongation.

10. **Expected Results:** Broadleaf weed growth stops almost immediately. Grassy weeds show a reduction in growth and a loss of competitiveness. An early yellowing or browning of the younger plant tissues is followed by a progressive collapse of the remaining foliage. These results will generally be observed in 1 - 3 weeks, depending on the grass species treated and the environmental conditions. **Poor results may be expected** if there is improper mixing, timing or coverage, or when weeds are under stress.

11. **Effects of Rainfall:** If rainfall occurs soon after application, control may be reduced. Four to six hours of dry weather are needed to allow Muster Gold II to be absorbed by weed foliage. Environmental conditions that slow the drying of Muster Gold II on the foliage, such as high relative humidity, cool air temperature or cloud cover, may increase the time required.

12. **Movement in Soil:** Movement is restricted by finely textured soils, soil organic matter and neutral to acidic conditions.

13. **Cropping Restrictions:**

Minimum crop rotation guidelines: Minimum interval is that from the last application of Muster Gold II to the date of planting the rotational crop.

Interval prior to planting (months after application): 10 months - spring wheat, durum wheat, barley, flax, oats. 22 months - alfalfa, canary grass, canola, drybeans, fababeans, fescue, lentils, peas, red clover, tame mustard. All other crops, field bioassay at 22 months.

Muster Gold II (cont'd)

Grazing restrictions: Do not graze treated fields or harvest for forage or hay. Do not harvest within 64 days of treatment.

* Wherever Muster is used on land previously treated with Ally herbicide, read the rotational guidelines on both labels and follow the label with the longest interval stated for your situation.

- 14. Toxicity:** Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) >5,000 mg/kg. May irritate eyes, nose, throat and skin.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Store in a cool, dry place, but not below 5°C.
- 17. Resistance Management:** See page 41 for information on resistance management.

Nortron/Etho SC (ethofumesate)

Group 16

Manufacturer: Bayer CropScience Inc./United Phosphorus, Inc./United Agri Products Canada Inc. (distributor)

- 1. Formulations:** Suspension concentrate; 480 g/L Nortron (PCP# 17293)/Etho SC (PCP# 28350); 10 L jug.
- 2. Registered Mixes:** Ro-Neet, Pyramin.
- 3. Crops:** Sugar beets.
- 4. Weeds Controlled:**

barnyard grass	lady's-thumb	redroot pigweed	volunteer oats
foxtail	lamb's-quarters	shepherd's-purse	volunteer wheat
kochia	purslane	volunteer barley	wild oats

- 5. Weeds Suppressed:** Black nightshade, Russian thistle, wild buckwheat.
- 6. When Used:** Nortron may be fall-layered, spring-applied before planting and pre-emergence.
- 7. How to Apply:**

With: Ground equipment.

Rate: Dependent upon soil type – 1.3 L - 3.3 L per acre broadcast; 0.4 - 1.13 L per acre applied on an 18 cm band/55 cm row.

Norton + Pyramin tank mix: For medium textured soils (silt and clay loams with <3% organic matter) 1.48 L/ac Nortron + 2.12 L/ac Pyramin broadcast basis; **or** 0.48 L/ac Nortron + 0.7 L/ac Pyramin applied on an 18 cm band/55 cm row. **Note:** This tank mix is not recommended on light textured soils (sands, loamy sands and sandy loams).

Water volume: 44 - 222 litres per acre.

Pressure: Apply Nortron to the soil using standard low pressure (150 - 350 kPa) spray equipment.

Nozzles: Do not use smaller than 50 mesh strainer nor less than an 8002E nozzle orifice.

- 8. Application Tips:** Apply Nortron before or at planting time and incorporate into the soil to a depth of 2.5 - 5.0 cm. Deeper incorporation may reduce effectiveness. Nortron may be applied pre-emergence at the time of planting or shortly after, but prior to weed emergence.

Incorporation equipment: Hooded-power or ground-driven rotary tillers, rolling cultivators and harrows are most effective for incorporating Nortron into the soil. Do not apply Nortron through soil injector shanks. Large clods can reduce the effectiveness of Nortron. All existing vegetative growth should be thoroughly worked into the soil before treatment. Do not allow spray mixture to stand in tank overnight.

- 9. How it Works:** Uptake of ethofumesate occurs primarily via the emerging shoot as it passes upwards through treated soil; however, for certain broadleaf species, root uptake is more important. Ethofumesate is non-volatile, and in all cases, uptake occurs from aqueous solution.

Safety information, see page 25

- 10. Expected Results:** Nortron, applied pre-plant incorporated with proper activation, will normally not permit weed emergence. If emergence should occur, uptake has occurred; seedling will show loss of vigour and eventual death.
- 11. Effects of Rainfall:** Normally 1.5 cm of rainfall is sufficient to activate Nortron. In areas where moisture can be marginal, incorporation is recommended.
- 12. Movement in Soil:** Under normal conditions, ethofumesate is only slowly leached from the soil surface, and most of the material remains concentrated in the upper 15 cm.
- 13. Cropping Restrictions:** Do not rotate with any crops other than sugar beets for 12 months after application. Thorough tillage, including moldboard plowing, should precede the planting of crops other than sugar beets. Do not use Nortron on muck or peat soils. If crop is lost due to climatic or soil conditions following application of Nortron, do not plant crops other than sugar beets in Nortron-treated land during the same season. If fields are replanted to sugar beets, reseed into treated band. Do not retreat field with Nortron. To reduce injury to rotational crops following a dry sugar beet season, Nortron should be applied only in a band, and field should be moldboard plowed after harvest. Wheat and barley may be injured if planted following a dry sugar beet year.
- Grazing restrictions:** Where Nortron is used in combination with TCA, do not use treated sugar beet tops for feed or forage.

14. Toxicity:**S.C. formulation**Acute oral LD₅₀ (rat): 2,100 mg/kgAcute dermal LD₅₀ (rat): >4,100 mg/kg**Technical material**Acute oral LD₅₀ (rat): 6,400 mg/kgAcute oral LD₅₀ (bobwhite quail): >8,343 mg/kgAcute dermal LD₅₀ (rat): >1,440 mg/kgDietary LD₅₀ (mallard duck): >10,000 mg/kg

Toxic to fish.

Danger: Eye irritant. Causes eye or skin irritation. Do not get in eyes, on skin or on clothing. Harmful if swallowed. **Avoid inhalation of fumes.**

- 15. Precautions, First Aid:** Check label for first aid information.

- 16. Storage:** Do not use or store near heat or open flames. Store Nortron in a cool place, above 0°C.

- 17. Resistance Management:** See page 41 for information on resistance management.

Nuance (tribenuron-methyl)

Group 2

Manufacturer: Cheminova Canada Inc.



Caution Poison

- 1. Formulations:** Dry flowable; 75%, 320 g container Nuance (PCP# 29468) packaged with 10 L jug 2,4-D ester LV 700 (PCP# 28309).
- 2. Registered Mixes:** Nuance herbicide must be tank mixed with 2,4-D. Do not use Nuance alone. 2,4-D Ester LV 700 (240 mL/ac - 323 mL/ac), Assert + 2,4-D Ester LV 700 (spring and durum wheat), Banvel II + 2,4-D Ester LV 700 (spring wheat and barley), Puma¹²⁰ Super + 2,4-D Ester LV 700 (spring wheat, durum wheat and barley).

Nuance (cont'd)

Mixing instructions: Add 1/3 required amount of water. While agitating, add Nuance and ensure it is completely suspended. Add 2,4-D Ester. Complete filling. Antifoaming agents may be required. For repeat tank loads, reduce remaining mixture to 10% of original spray volumes or pre-slurry Nuance.

3. Crops: Barley, durum wheat, spring wheat, summerfallow.

Underseeding: Do not apply to wheat and barley underseeded to legumes or grasses.

4. Weeds Controlled: Nuance and 2,4-D Ester

annual sunflower	kochia (2 - 10 leaf) (8.1)	Russian pigweed	thyme-leaved spurge
ball mustard (8.6)	lamb's-quarters (8.2)	Russian thistle (8.5)	tumble mustard (8.6)
cow cockle (8.9)	narrow-leaved hawk's-beard	shepherd's-purse	wild mustard (8.6)
flixweed	prickly lettuce	stinkweed (8.9)	wild radish
hare's-ear mustard (8.6)	redroot pigweed (8.6)	sweet clover	wormseed mustard (8.6)
Indian mustard (8.6)			

Nuance + 2,4-D Ester + Assert: All weeds controlled by Nuance Pack plus wild oats.

Nuance + 2,4-D + Banvel II: All weeds controlled by Nuance Pack plus sulfonyurea resistant kochia.

Nuance + 2,4-D Ester + Puma¹²⁰ Super: All weeds controlled by Nuance Pack plus green foxtail.

5. Weeds Suppressed: Canada thistle (top growth control) (6.9), wild buckwheat (1 - 3 leaf) (8.1).

6. When Used:

Crop stage: Barley, spring wheat (including durum): 3 leaf expanded to just before the flag leaf stage (shot blade). Do not apply after the head has emerged.

Weed stage: Apply to young, emerged actively growing weeds that are less than 10 cm tall or across and before the crop canopy closes.

Summerfallow (control of fall rosettes and spring seedlings of shepherd's-purse, narrow-leaved hawk's-beard, flixweed and stinkweed): Apply the tank mix in the spring after emergence, up to the early flowering stage. Only weeds that have emerged at the time of application will be controlled.

7. How to Apply:

With: Ground equipment. Do not apply by air.

Rate:

Tank mixes	Nuance (g/ac)	2,4-D Ester LV 700 (mL/ac)	Assert (mL/ac)	Banvel (mL/ac)	Puma ¹²⁰ Super (mL/ac)
Nuance Pack alone	4	250	—	—	—
Nuance Pack plus Assert	4	250	500 - 670	—	—
Nuance Pack plus Banvel II	4	250	—	45	—
Nuance Pack plus Puma ¹²⁰ Super	4	250	—	—	156

Water volume: 40 L/ac.

Pressure: 210 - 275 kPa.

Nozzles: Use flat fan nozzles. Do not use flood jet nozzles. Use 50 mesh screens or larger.

Sprayer cleanup: To avoid injury to susceptible crops, clean sprayer thoroughly immediately after spraying. Use cleanup method A on page 16.

8. Application Tips: Wild oat herbicides require a 4 - 5 day interval before or after an application of Nuance. Effectiveness may be reduced if spray mixture remains in tank for more than 24 hours. When tank mixed with Assert, apply within 12 hours of mixing.

9. How it Works: Absorbed by foliage and roots, inhibits cell elongation.

10. Expected Results: Nuance stops growth of susceptible weeds immediately. However, typical symptoms (discolouration) of dying weeds may not be noticeable for 1 - 3 weeks after application, depending on growing conditions and weed susceptibility. Degree of control and duration of effect depend on weed

sensitivity, weed size, spray coverage and growing conditions. Favorable growing conditions following treatment promote the activity of Nuance while cold, dry conditions delay the activity.

11. **Effects of Rainfall:** If rain occurs soon after application, control may be reduced. 4 - 6 hours of dry weather are needed to allow Nuance to be absorbed by weed foliage.
12. **Movement in Soil:** Nuance moves little in the soil. Its life in the soil is very short.
13. **Cropping Restrictions:** Wheat or barley may be grazed or cut for hay 7 days after application. (A minimum recropping interval of 2 months should be left between the application of Nuance and seeding of the next crop. The following crops can be seeded after 2 months: canola, flax, lentils, alfalfa).
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) = >5,000 mg/kg. May irritate eyes, nose, throat and skin.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Store in a cool, dry place.
17. **Resistance Management:** See page 41 for information on resistance management.

Odyssey (imazamox + imazethapyr)

Group 2

Manufacturer: BASF Canada

1. **Formulations:** Water dispersible granular; 70% (35% imazamox + 35% imazethapyr); each case contains 8 x 86.5 g bags, each case treats 40 acres.
Four cases per carton and each carton does 160 acres (PCP# 25111).

2. **Registered Mixes:** Lontrel (Clearfield Canola).

Surfactants: Use only Merge at 0.5% v/v. **The surfactant is not included in the package.**

Mixing instructions: Use a 50 mesh (or coarser) filter screen. Fill sprayer tank with 3/4 the required amount of clean water, start agitation and continue agitation throughout the entire mixing and spraying procedure. Add the required amount of Odyssey soluble bag(s) directly into the sprayer tank opening. Agitate for at least 10 minutes to dissolve herbicide, if mixing with Lontrel, add Lontrel to the tank and agitate, mixing thoroughly. Add the required amount of Merge. Complete filling the tank to the desired level with water.

3. **Crops:** Alfalfa (seedling and established grown for seed), Clearfield canola, field peas and Clearfield lentils, Clearfield XCEED and fenugreek (for seed production).

4. **Weeds Controlled:**

17 g/ac

barnyard grass

chickweed

cleavers

flixweed

green foxtail

green smartweed

hemp-nettle**

Persian darnel

redroot pigweed

Russian thistle*

shepherd's-purse

stinkweed

stork's-bill

volunteer canola (except

Clearfield canola)

volunteer wheat (except

Clearfield wheat)

volunteer barley

volunteer oats

volunteer tame mustard

(not XCEED varieties)

wild buckwheat**

wild mustard

wild oats

* Suppression in Clearfield lentils.

** Suppression in Clearfield lentils and peas.

5. **Weeds Suppressed:** Kochia* (suppressed in peas and canola, not controlled in lentils), lamb's-quarters.

* **Note:** Prairie-wide surveys of kochia fields have found approximately 90% of kochia populations that are Group 2 herbicide resistant. Without testing to confirm, assume the kochia in your field is resistant and will not be controlled by this product alone.

Odyssey (cont'd)

6. When Used. Crop stage: Alfalfa: 1 - 4 leaf stage and after the weeds have emerged. Clearfield canola and Clearfield Xceed canola (all soil zones): 2 - 6 true leaf. Field peas: 1 - 6 above ground nodes (1 - 6 true leaf stage) of field peas and after the weeds have emerged. Clearfield lentils: 1 - 6 above ground nodes. **Weed stage:** Grasses: Apply from the 1 - 4 true leaf stage up to early tillering. Broadleaf weeds: Apply from the cotyledon to 4 leaf stage.

7. How to Apply:

With: Ground equipment only.

Rate: 17 g/ac.

Surfactant: Merge at 0.5% v/v (e.g. 5 L/1,000 L spray solution).

Water volume: 40 L/ac.

Pressure: 275 kPa.

Nozzles: 50 mesh screens (or coarser). Flat fan recommended tilted 45° forward for better penetration.

Incorporation: Not applicable.

8. Application Tips: Water soluble bags will dissolve better when kept intact, do not split bags. If agitation is stopped for more than 5 minutes, re-suspend spray solution by full agitation prior to commencing spraying again. Do not spray Odyssey if temperatures of +5°C or lower are forecasted within 3 days of application. Temperatures near freezing (below 5°C) will prevent optimum herbicide performance, as weeds are not actively growing. Initial transient crop yellowing may be observed after application, but this is outgrown and should not affect yield.

9. How it Works: Absorbed by foliage and roots. Disrupts plant metabolism causing growth to stop. Works best under good growing conditions. Residual activity of small seeded, shallow germinating flushing weeds (not wild oats) expected until crop flowering. Moist conditions result in better residual control.

10. Expected Results: Susceptible weeds stop growing within 24 - 48 hours. Yellow striping and purplish or reddish discolouration of the leaves may occur. Leaves begin to die in 3 - 10 days starting with the youngest and moving to the older leaves. Death of the plant may occur in 1 - 3 weeks.

11. Effects of Rainfall: Do not apply if rain is expected within 3 hours.

12. Movement in Soil: Not leached appreciably.

13. Cropping Restrictions:

Minimum interval to harvest: 60 days.

Succeeding crops: Barley, Clearfield canola, Clearfield Xceed canola, canary seed, chickpeas, durum wheat, field corn, field peas, lentils (incl. Clearfield lentils), oats, spring wheat and Xceed can be grown safely the year following an application. Flax, non-Clearfield canola and sunflowers can be grown in the second year after an Odyssey application (e.g. if you used Odyssey in 2005, you can grow conventional canola in 2007). For other crops, call BASF at 1-877-371-2273. Conduct a field bioassay the year before growing any crops other than those listed above. In case of crop failure, replant only to Clearfield canola or field peas.

Grazing restrictions: Do not graze treated crops or cut for hay; there are not sufficient data to support such use. Field peas treated with Odyssey may be fed to livestock 30 days after application. Only apply Odyssey once per year.

14. Toxicity: Low acute mammalian toxicity. Acute oral LD₅₀ (rats) 5,000 mg/kg. Non-toxic to fish, birds and bees.

15. Precautions, First Aid: Check label for first aid information.

16. Storage: Store at temperatures above 5°C. Keep unused water soluble bags in resealed, original container. Keep packages dry at all time.

17. Resistance Management: See page 41 for information on resistance management.

Odyssey DLX

(imazamox + imazethapyr + tepraloxydim)

Manufacturer: BASF Canada

Group 1,2



Caution Poison



Warning Irritant

Herbicides

1. **Formulations:** **Odyssey:** Dispersible granule; 35% imazamox + 35% imazethapyr (PCP# 25111); 8 x 86.5 g. **Equinox:** Emulsifiable concentrate; 20% (PCP# 27603); 2.67 L.
Container size: 8 x 86.5 g Odyssey + 2.67 L Equinox + Merge surfactant (PCP# 24702); 8.1 L jug.
2. **Registered Mixes:**
Herbicides: None registered.
Fertilizers: None registered.
Insecticides: None registered.
Fungicides: None registered.
Surfactants: A surfactant must be used with Odyssey DLX. Use only Merge surfactant at 0.5% Merge v/v.
Mixing instructions: Use a 50 mesh (or coarser) filter screen. Use method "b" on page 12. When mixing, add the Odyssey first, then the Equinox and finally the Merge. Check labels of products to be mixed for further directions.
3. **Crops:** Field peas, Clearfield canola and Clearfield lentils.
4. **Weeds Controlled:**
Grasses – 1 to 4 main stem leaves, until tillers are visible:
barnyard grass Persian darnel
Grasses – 1 to 6 main stem leaves including two tillers:
green foxtail volunteer oats wild oat
volunteer barley volunteer wheat (incl. Clearfield wheat)
Broadleaf weeds – cotyledon to 4 leaf or 4 whorl stage:
chickweed hemp nettle** stinkweed volunteer canola (not
cleavers redroot pigweed stork's-bill Clearfield varieties)
flixweed Russian thistle* volunteer tame mustard wild buckwheat**
green smartweed shepherd's purse wild mustard
* Russian thistle is suppressed in Clearfield lentils.
** suppression in field peas and Clearfield lentils.
5. **Weeds Suppressed:** Hemp-nettle, kochia*, lamb's-quarters.
* **Note:** Prairie-wide surveys of kochia fields have found approximately 90% of kochia populations that are Group 2 herbicide resistant. Without testing to confirm, assume the kochia in your field is resistant and will not be controlled by this product alone.
6. **When Used: Crop stage:** Field peas: 1 to 6 above-ground nodes (1 to 6 true leaves); Clearfield canola: 2 – 6 leaf stage; Clearfield lentils: 1 to 6 node stage.
7. **How to Apply:**
With: Ground equipment only.
Rate: **Odyssey** 40 acre case, 17 g/ac + **Equinox** 67 mL/ac.
Surfactant: Merge surfactant at 0.5% Merge v/v (e.g. 5 L/1,000 L spray solution).
Water volume: 40 L/ac.
Pressure: 275 kPa.
Nozzles: The use of 80° - 110° flat fan nozzles tilted forward at 45° is recommended to ensure optimum coverage. Use 50 mesh or coarser filter screens.
Incorporation: Not applicable.

Safety information, see page 25

Odyssey DLX (cont'd)

- 8. Application Tips:** Water soluble bags will dissolve better when kept intact, do not split bags. If agitation is stopped for more than 5 minutes, re-suspend spray solution by full agitation prior to commencing spraying again. Do not spray Odyssey DLX if temperatures of +5°C or lower are forecasted within 3 days of application. Temperatures near freezing (below 5°C) will prevent optimum herbicide performance, as weeds are not actively growing. Apply when weeds are small and actively growing, soil moisture is good and the crop is small enough to permit through spray coverage. During periods of stress, plants are not actively growing and reduced weed control or crop injury may result. When grasses are stressed due to drought, flooding, hot or prolonged cool temperatures (15°C or less) or coverage is inadequate, unsatisfactory control may result. Initial transient crop yellowing may be observed after application, but this is outgrown and should not affect yield.
- 9. How it Works:** Absorbed by foliage and roots. Disrupts plant metabolism causing growth to stop. Works best under good growing conditions. Residual activity of small seeded, shallow germinating flushing weeds (not wild oats) expected until crop flowering. Moist conditions result in better residual control.
- 10. Expected Results:** Odyssey causes susceptible weeds to stop growing within 24 - 48 hours. Yellow striping and purplish or reddish discolouration of the leaves may occur. Leaves begin to die in 3 - 10 days starting with the youngest and moving to the older leaves. Death of the plant may occur in 1 - 3 weeks. Equinox is a systemic herbicide that causes growth to cease with 48 hours. Young leaves will turn yellow within 5 - 10 days; some grasses will then turn reddish. Necrotic spots will form on grass leaves.
- 11. Effects of Rainfall:** Do not spray if there is a forecast of rain during or soon after application as the rain may reduce control.
- 12. Movement in Soil:** Product does not leach.
- 13. Cropping Restrictions:**

Minimum interval to harvest: Do not apply within 60 days of harvest.

Succeeding crops: Barley, Clearfield and Xceed canola, Clearfield lentils, canary seed, chickpeas, corn, durum wheat, field peas, lentils, oats and spring wheat can be grown safely the year following an application. Flax, non-Clearfield canola and sunflowers can be grown in the second year after an Odyssey DLX application (e.g. if you used Odyssey DLX in 2005, you can grow conventional canola in 2007). For other crops, call BASF at 1-877-371-2273. Conduct a field bioassay the year before growing any crops other than those listed above. In case of crop failure, replant only to Clearfield canola or field peas.

Grazing: Do not graze treated peas prior to 60 days after application.
- 14. Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) 5,000 mg/kg. Non-toxic to fish, birds and bees.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Store at temperatures above 5°C. Keep unused water soluble bags in resealed, original container. Keep packages dry at all time.
- 17. Resistance Management:** See page 41 for information on resistance management.

Pardner/Koril/Bromotril/ Brotex 240 (bromoxynil)

Group 6

Manufacturer: Bayer CropScience/Nufarm Agriculture/MANA Canada/Interprovincial Co-operatives



Warning Poison

- 1. Formulations:** Emulsifiable concentrate; **Pardner:** 280 g/L (PCP# 18001); 8 L jug.
Koril: 235 g/L (PCP# 25341); 9.71 L jug. **Bromotril 240 EC:** 240 g/L (PCP# 28276); 9.7 L jug.
Brotex 240: 240 g/L (PCP# 28519); 9.7 L jug.

Safety information, see page 25

- 2. Registered Mixes:** Low rate Atrazine (corn, sweet, field); Avenge or Avenge + MCPA Ester (barley, Avenge wheat varieties); Banvel (field corn), seedling grasses (brome, creeping red fescue, crested and intermediate wheatgrass, Russian wild ryegrass), spring wheat. MCPA (Amine, Ester, K-salt) (barley, oats, wheat, canary seed, seedling grasses, fall rye); glyphosate (chemical fallow); 2,4-D (Amine, Ester) (barley, wheat). Achieve 40/80 DG (barley, wheat), Horizon (wheat), Ultim or Ultim + Atrazine (corn), Accent (corn). Both products are recommended in tank mix with other products; follow all instructions for mixing, spraying precautions, limitations, crop rotations, application timing, preharvest intervals, etc. on labels of products tank mixed with Mextrol 450 liquid herbicide.

Mixing restrictions: Add Atrazine; MCPA; or 2,4-D to water first, then Pardner/Koril/Bromotril/Brotex.

3. Crops:

Underseeding: Not recommended for legumes other than alfalfa.

alfalfa (seedling)	field corn (9.0)	grain pearl millet ¹	triticale (9.0)
barley (9.0)	flax	grain sorghum ¹	winter wheat (8.9)
canary seed (9.0)	forage millet ^{1,2}	oats (8.8)	
durum wheat (8.9)	forage sorghum ^{1,2}	spring wheat (8.9)	
fall rye	garlic	sweet corn (8.3)	

¹ Registered for Pardner

² Registered for Bromotril and Brotex

Seedling grasses for seed production

bromegrass (8.7)	intermediate wheatgrass	reed canary grass (8.3)	tall wheatgrass
creeping red fescue (8.6)	meadow fescue (8.3)	Russian wild rye (8.9)	timothy (8.8)
crested wheatgrass (8.3)	orchard grass (8.6)	slender wheatgrass	

Established alfalfa (for seed production only).

4. Weeds Controlled:

American nightshade	common groundsel (9.0)	lady's-thumb	stinkweed (8.4)
annual smartweed (8.1)	common ragweed	lamb's-quarters (8.4)	tartary buckwheat (8.4)
black nightshade	cow cockle (6.9)	night-flowering catchfly (8.0)	volunteer buckwheat (8.4)
bluebur	knawel (7.7)	redroot pigweed (7.9)*	wild buckwheat (8.4)
cocklebur	kochia	Russian thistle (8.4)	wild mustard (8.5)

* Triazine resistant

5. Weeds Suppressed: None.

6. When Used:

Crop stage: Barley, canary seed, corn (field, sweet), oats, triticale, wheat: 2 leaf to early flag leaf. 2,4-D mix on wheat or barley after 4 leaf. Winter wheat, fall rye: first growth to early flag leaf.

Corn: Pardner/Koril/Bromotril/Brotex alone or Atrazine mix: until crop is 25 cm tall. Canary seed: 3 - 5 leaf. Apply when forage sorghum, grain sorghum, forage millet and grain pearl millet is at or beyond the 4 leaf stage and less than 20 cm in height.

Seedling grasses, grown for seed production: 2 - 4 leaf. Seedling alfalfa: 2 - 6 trifoliate stage.

Established alfalfa: Treat at any stage of growth; maximum 2 applications per year.

Weed stage: Seedling to 4 leaf stage, except Russian thistle to 5 cm tall. Generally best results if weeds are in seedling stage. Scentless chamomile and knawel: before 3 leaf stage.

7. How to Apply:

With: Ground equipment or aircraft (wheat and barley only). Spra-coups not recommended.

Pardner/Koril/Bromotril/Brotex 240 (cont'd)

Rate:

Crop	Pardner	Koril/Bromotril/Brotex
Barley, field corn, oats, sweet corn, triticale, wheat	405 - 485 mL/ac	486 - 567 mL/ac
Canary seed	405 mL/ac	486 mL/ac
Fall rye, winter wheat	405 - 485 mL/ac	486 - 567 mL/ac
Flax	405 mL/ac	486 mL/ac
Seedling grasses (grown for seed production only)	405 - 485 mL/ac	486 - 567 mL/ac
Seedling alfalfa	405 mL/ac	486 mL/ac
Established alfalfa (for seed production only)	405 - 485 mL/ac	486 - 567 mL/ac

Water volume: 40 L/ac. Corn: 60 L/ac; 8 L/ac (air).

Pressure: 275 kPa.

Nozzles: Flat fan nozzles recommended or Hollow cone (air only).

- 8. Application Tips:** Avoid spraying crops during adverse growing conditions, especially drought, high temperatures (over 29°C) or in high humidity.
- 9. How it Works:** A contact herbicide, so good coverage is essential. Inhibits respiration and photosynthesis causing death.
- 10. Expected Results:**

Weeds: Turn brown and die within 3 - 5 days - more rapid under good growing conditions and when applied to seedling weeds. **Poor results can be expected if** weeds past 4 leaf stage, poor spray coverage or lower than recommended rate used. Injury to corn may occur if under stress.
- 11. Effects of Rainfall:** Rainfall within 2 hours of application may reduce weed control.
- 12. Movement in Soil:** None.
- 13. Cropping Restrictions:**

Succeeding crops: No restrictions.

Grazing restrictions: Do not graze or harvest for green feed until 30 days after treatment. For grain sorghum and grain pearl millet observe a post harvest interval of 100 days.
- 14. Toxicity:** Moderate acute mammalian toxicity. Very toxic to fish. Intake of a large dose may cause convulsions, sudden collapse and coma. Can be absorbed through the skin.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Pardner/Koril/Bromotril/Brotex formulations will solidify at temperatures below -20°C, but will be usable again at temperatures above 0°C.
- 17. Resistance Management:** See page 41 for information on resistance management.

Payload Herbicide



Caution Poison

Manufacturers: Valent Canada, Inc.

Group 14

Formulations

Product	Company	Active Ingredient	Formulation	Container size
Payload Herbicide	Valent Canada, Inc.	Flumioxazin	51% WDG	2.27kg

Crops and Staging

Notes: Payload, when used as directed, can be used for non-selective vegetation control to maintain bare ground non-crop areas that must be kept weed-free. Apply Payload to:

- Bare ground to railroad beds, under guard rails, and above-ground pipelines.

Safety information, see page 25

- Bare ground in parking and storage areas, plant sites, substations, pumping stations, oil yards/substations and tank farms.
- Bare ground areas of airports, brick yards, industrial plant sites, lumber yards, and storage areas.
- Bare ground around farm buildings and along fence rows.
- Road surfaces and gravel shoulders.

Weeds Controlled, Rates and Staging

Weed stage: preemergence

Rates: 113-170 grams product/acre

Common ragweed*

Dandelion

Green foxtail

Hairy nightshade

Common lamb's-quarters

Eastern black nightshade

Green pigweed

Redroot pigweed

Tank Mixes

Herbicide tank mix partner	Crops registered	Rate of herbicide tank mix partner	Remarks (adjuvant rate, crop staging and any other restrictions)
Glyphosate, present as isopropyl amine or potassium salt	Non-crop areas	0.49 kg/ac	

Application Information

Water volume: Ground. Apply in sufficient water for uniform coverage. Do not apply by air.

How it Works

Payload offers residual control of susceptible broadleaf and grass weeds listed on this label and assists in the control of acetolactate synthase (ALS) resistant weeds. The length of residual control is dependent on application rate as well as on rainfall and temperature conditions. Length of residual control will decrease as temperature and precipitation increase and on soils with high organic matter and/or high clay content.

Expected Results

Effect of Rainfall: Moisture is necessary to activate Payload in soil for residual weed control. Dry weather following applications of Payload may reduce effectiveness. However, when adequate moisture is received after dry conditions, Payload will control susceptible germinating weeds. Payload may not control weeds that germinate after application but before an activating rainfall/irrigation or weeds that germinate through cracks resulting from dry soil.

When adequate moisture is not received after a Payload application, weed control may be improved by irrigation with at least ½ cm of water. Weed control will be reduced if there is mechanical incorporation into the soil or if emerged weeds are controlled by cultivation.

Restrictions

- Do not apply by air. Ground application only.
- Do not apply to fine-textured soils.
- Do not apply to farm alleys or roads where traffic may result in treated dust settling onto crops or other desirable vegetation.
- Do not apply within 100 metres of non-dormant pears.
- Do not apply to powdery soils or soils that are susceptible to wind displacement unless irrigation can be applied immediately after application.
- Do not make more than two applications per growing season.

Grazing: Do not graze treated fields or feed treated forage or hay to livestock.

Environmental Hazards

This product is toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones specified under DIRECTIONS FOR USE. Toxic to small wild mammals. Toxic to certain beneficial insects. Minimize spray drift to reduce harmful effects on beneficial insects in habitats next to the application site such as hedgerows and woodland. To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil, or clay. Avoid application when heavy rain is forecast. Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip between the treated area and the edge of the water body.

Payload Herbicide (cont'd)

Drift: Field sprayer application: DO NOT apply during periods of dead calm. Avoid application of this product when winds are gusty. DO NOT apply with spray droplets smaller than the American Society of Agricultural Engineers (ASAE) medium classification. Boom height must be 60 cm or less above the crop or ground.

Buffer zone guideline: Use of the following spray methods or equipment DO NOT require a buffer zone: hand-held or backpack sprayer and spot treatment.

For application to rights-of-way (such as bareground to railroad beds, under guard rails, above-ground pipelines, road surfaces and gravel shoulders) buffer zones for protection of sensitive terrestrial habitats are not required; however, the best available application strategies which minimize off-site drift, including meteorological conditions (e.g., wind direction, low wind speed) and spray equipment (e.g., coarse droplet sizes, minimizing height above canopy), should be used. Applicators must, however, observe the specified buffer zones for protection of sensitive aquatic habitats.

The buffer zones specified in the table below are required between the point of direct application and the closest downwind edge of sensitive terrestrial habitats (such as grasslands, forested areas, shelter belts, woodlots, hedgerows, riparian areas and shrublands), sensitive aquatic habitats (such as lakes, rivers, sloughs, ponds, prairie potholes, creeks, marshes, streams, reservoirs, wetlands and estuarine/marine habitats).

Method of application	Crop	Buffer zones (metres) required for the protection of:		
		Aquatic habitats of depths:		Terrestrial habitat
		Less than 1 m	Greater than 1 m	
Field sprayer*	In field-grown ornamentals, bare ground, non-crop	5	3	25

*For field sprayer application, buffer zones can be reduced with the use of drift reducing spray shields. When using a spray boom fitted with a full shield (shroud, curtain) that extends to the crop canopy, the labelled buffer zone can be reduced by 70%. When using a spray boom where individual nozzles are fitted with cone-shaped shields that are no more than 30 cm above the crop canopy, the labelled buffer zone can be reduced by 30%.

Toxicity

No product specific data available.

Storage

Do not contaminate water, food or feed by storage. Keep pesticide in original container. Store in a cool, dry, secure place. Do not put formulation or dilute spray solution into food or drink containers. Do not store or transport near feed or food. Not for use or storage in or around the home. To prevent contamination, store this product away from food or feed.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.

Poast Ultra (sethoxydim)

Manufactured by BASF Canada

Group 1



Caution Poison

1. **Formulations:** Emulsifiable concentrate; 450 g/L (PCP# 24835); 2 x 7.7 L.

2. **Registered Mixes:**

Canola: Lontrel, Muster, Pursuit (Clearfield canola only), Liberty (Liberty Link canola only).

Flax: Buctril M, Logic M, MCPA Ester, Lontrel, Lontrel + MCPA Ester. **Field peas:** Pursuit.

Safety information, see page 25

Surfactants: Use only Merge. The surfactant is not included in the package.

Mixing instructions:

Poast Ultra + Pursuit: A reduced rate of Pursuit (42.5 mL/acre) can be used when Poast Ultra and Pursuit are tank mixed. The 85 mL/ac rate of Pursuit may also be tank mixed with Poast Ultra. Do not use a rate of Poast Ultra less than 190 mL/acre in tank mixes with Pursuit.

Poast Ultra + Liberty + Merge: A reduced rate of Poast Ultra (95 mL/ac) can be tank mixed with Liberty to control volunteer barley. Merge should be added at 0.4 L/ac. Refer to Liberty label for use instructions.

Usual mix order	Mix order exceptions
1. Poast Ultra	1. Muster
2. Broadleaf herbicide	2. Poast Ultra
3. Merge	3. Merge

3. Crops:

adzuki beans (9.0)	coriander	green peppers	raspberry
alfalfa	cranberry	highbush blueberries	safflower
(seedling & established)	creeping red fescue	hops	shrubs (fruit bearing)
asparagus	(seed production only)	lentils (9.0)	snap beans (9.0)
borage	cucumbers* (8.9)	lima beans (9.0)	snow peas
broccoli	dill	linola	soybeans (9.0)
buckwheat	dry bulb onions (8.8)	lupin	spearmint
cabbage	dry common beans (9.0)	mung beans (9.0)	spinach
canola (9.0)	ethnic cole crops	mustard	squash
caraway	fababeans (9.0)	orchards (newly	strawberry
carrots	field peas (9.0)	planted, non-bearing)	sugar beets (9.0)
cauliflower	field peppers	peppermint	sunflower
chickling vetch	flax (including	populus spp.	sweet potatoes
chickpeas	low linolenic)(9.0)	potatoes (9.0)	tomatoes
chokecherry (shelterbelts)	fresh peas (9.0)	processing peas (9.0)	trees (fruit bearing &
common beans (9.0)	garlic	pumpkin	non-fruit bearing)
			turnip

Forage legumes for seed (seedling & established)

alfalfa	cicer milkvetch	sainfoin	sweet clover
alsike clover			

4. Weeds Controlled:

barley grass (8.6)	Persian dandel (8.7)	volunteer oats (8.4)	wild proso millet
crabgrass	quackgrass (6.0)*	volunteer spring wheat (8.4)	witch grass
fall panicum	volunteer barley (8.5)	wild oats (8.4)	yellow foxtail
green foxtail (8.3)	volunteer corn (7.0)		

* Season-long control.

5. Weeds Suppressed: Foxtail barley, quackgrass.

6. When Used:

Weed stage: Annual grasses: 1 - 6 leaf stage (optimum results at 2 - 5 leaf stage when annual grasses are small and actively growing). Wild oats and volunteer cereals: 1 - 4 leaf stage (best results prior to tillering). Quackgrass: up to 3 leaf (8 - 12 cm tall). Foxtail barley: 1 - 4 leaf.

7. How to Apply:

Poast Ultra (cont'd)

With: Aircraft or ground equipment.

Rate:

Grass species controlled	Grass leaf stage	Poast Ultra* mL/ac	Merge		Aerial application water volume 10 - 20 L/ac
			Ground application water volume 20 - 44 L/ac	45 - 80 L/ac	
Annual grasses Barnyard grass, crabgrass (large), fall panicum, green foxtail, Persian dandel, proso millet, volunteer corn, witchgrass, yellow foxtail	1 - 6	130	0.2 - 0.4	0.4	0.1 - 0.2
Wild oats, volunteer cereals (Canola, flax and peas only)	1 - 4				
Annual grasses - listed above including volunteer cereals, wild oats	1 - 6	190	0.2 - 0.4	0.4	0.1 - 0.2
Suppression of quackgrass (Western Canada only)	2 - 5				
Quackgrass control	Up to 3	445	N/A	0.4 - 0.8	N/A
Suppression of foxtail barley plus annual grasses listed above	1 - 4				

* For band application, adjust rate per acre in relation to the band width (annual grasses only).

Water volume: Air: 10 - 20 L/ac. Ground: 20 - 45 L/ac. Dense foliage, heavy infestations and for quackgrass control: 45 - 80 L/ac.

Pressure: Air: 200 kPa. Ground: 240 kPa with low water volumes; 275 - 425 kPa with higher water volumes.

Nozzles: Flat fan only. Tilt forward 45° for better coverage. **The use of flood jet or hollow cone nozzles is not recommended because of uneven and inadequate spray coverage.**

8. Application Tips:

Poast Ultra applied at 130 mL/ac for the control of wild oats and volunteer cereals should only be applied under the following conditions:

- adequate moisture
- adequate fertility
- moderate temperatures (15°C - 28°C)
- absence of stress
- canola, flax and peas only (good crop stand is essential)
- early timing (1 - 4 true leaf stage of volunteer cereals and wild oats)
- light to moderate weed infestation levels
- low water volumes (20 - 40 L/ac)

Treat when weedy grasses are actively growing, there is good soil moisture and crop is small enough to permit thorough spray coverage. If annual grass weeds and broadleaf weeds are not in the correct stages for treatment, apply separate applications of each herbicide. Control of grasses growing under drought, flooding or prolonged cool temperatures under 15°C may be reduced or delayed. Do not spray Poast Ultra if

temperatures of +5°C or lower are forecasted within 3 days of application. Temperatures near freezing (below 5°C) will prevent optimum herbicide performance, as weeds are not actively growing. Escapes or re-tillering may occur under prolonged stress conditions or low fertility. **Do not apply on grasses stressed longer than 20 days due to lack of moisture as unsatisfactory control can result.** Thorough pre-plant tillage operations are required to fields where sod or forage grass crops may have grown in the previous year. For quackgrass only on cultivated land, pre-plant tillage will fragment rhizomes and improve control. Crop competition generally enhances control of quackgrass. In wide row crops, the quackgrass treatment should be followed by a cultivation after a minimum 7 days. Do not apply where runoff or erosion is likely. Allow 4 days between application of Poast Ultra and any other chemical not recommended as a tank mix combination. Do not allow mixtures to stand. Thoroughly clean sprayer after use by flushing with water and detergent. Prior to using Poast Ultra, ensure that the sprayer has been cleaned according to previous product manufacturer's specifications or sprayer cleanout recommendations. When tank mixing with Pursuit, the rate of Pursuit can be lowered to 42.5 mL/ac for the control of redroot pigweed, stinkweed, wild buckwheat, wild mustard, chickweed, cleavers, hemp-nettle and smartweed.

9. **How it Works:** Poast Ultra is a contact and a systemic herbicide. Absorbed primarily by foliage and translocated to the growing points. Inhibits formation of fatty acids in these tissues. Thorough coverage of the foliage is important for consistent grass control.
10. **Expected Results:** Susceptible grasses stop growing immediately, gradually turn yellow and then brown. The time required for complete control is normally 7 - 21 days (annual grasses). Control of quackgrass develops more slowly than control of annual grasses. Poast Ultra is translocated through the quackgrass plant to the rhizomes and kills actively growing rhizome buds, as well as above ground vegetation. Dormant rhizome buds will remain unaffected by the spray and regrowth can occur from these buds. The regrowth will not be significant until 6 - 8 weeks after treatment, depending on growing conditions, crop cultivation practices and crop competition.
11. **Effects of Rainfall:** Rainfall within 1 hour of application may reduce effectiveness.
12. **Movement in Soil:** Relatively immobile, breaks down rapidly in soil.
13. **Cropping Restrictions:**

Succeeding crops: Allow a minimum of 14 days between application and re-planting of cereal or grass crop. A cultivation to a minimum depth of 10 cm is recommended 7 days prior to seeding. Otherwise no restriction.

Spray to harvest interval (days): Alfalfa (70), beans [snap (56), common (60), white, kidney, pinto (80), adzuki, faba, lima, mung (80)], buckwheat (85), cucumbers (30); flax (60), garlic (50), lentils (65), onions (50); peas [fresh (30), processing (30), dry (60)], potatoes (80), rapeseed (70), soybeans (80); sugar beets (85), tomatoes (60).

Grazing restrictions: Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.
14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = formulation 2,500 mg/kg. Causes moderate skin and eye irritation. Low toxicity to birds, fish and bees. Hazards to the environment are low because of rapid breakdown in soil.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Store product in a cool, dry place. Freezing will not reduce effectiveness.
17. **Resistance Management:** See page 41 for information on resistance management.

PrePass (florasulam + glyphosate)

Group 2,9

Manufacturer: Dow AgroSciences Canada Inc.



Caution Poison

- Formulations:** **PrePass A:** 50 g/L florasulam SC (PCP# 27395); 1.6 L jug, 4 x 8 L. **PrePass B:** 360 g/L glyphosate (acid equivalent: present as an isopropylamine salt) (PCP# 27394); 2 x 10 L jugs, 4 x 100 L containers.
- Registered Mixes:** None.
- Crops:** Pre-seed burn-down and fall application (prior to planting barley, oats or wheat (including durum)); summerfallow applications.

4. Weeds Controlled:

Canada fleabane	green foxtail	Russian thistle	wild oats
cleavers	hemp-nettle	shepherd's-purse	volunteer flax
common chickweed	lady's-thumb	smartweed	volunteer wheat
common ragweed	lamb's-quarters	stinkweed	wild buckwheat**
crab grass	narrow-leaved	volunteer barley	wild mustard
dandelion*	hawk's-beard	volunteer canola (conventional,	
downy brome	persian dandel	Clearfield Liberty,	
flixweed	redroot pigweed	glyphosate tolerant)	
giant foxtail			

* Seedlings will be controlled.

** Up to 5 leaf stage.

5. Weeds Suppressed:

annual sow thistle	dandelion*	kochia	perennial sow thistle**
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* Rosettes greater than 6" (15 cm) will be suppressed.

** Applications at advanced stages will reduce effectiveness.

6. When Used:

Pre-seed burn-down: Apply PrePass prior to planting barley, oats or wheat to control emerged labelled weeds.

Summerfallow: Apply PrePass for control of labelled weeds.

Fall application: Apply PrePass in the fall to control annual broadleaf weeds and grasses prior to spring seeding of wheat (including durum), barley and oats.

Annual weeds: Grassy and broadleaf weeds that are actively growing.

Dandelion: Seedlings will be controlled; rosettes greater than 6" (15 cm) will be suppressed.

7. How to Apply:

With: Ground equipment only. With a sprayer that can apply 40 L/ac of spray solution. Do not apply by air.

Rate: PrePass A: 40 mL/ac. PrePass B: 500 mL/ac.

Water volume: 20 - 40 L/ac.

Pressure: Use low pressures 200 - 275 kPa.

Nozzles: Use nozzles that deliver higher volumes and coarser droplets.

Mixing instructions: Only use sprayers that have good agitation. Ensure the sprayer is properly cleaned prior to adding PrePass.

1. Fill the sprayer tank 1/2 full with water.
2. Start the sprayer agitation and continue agitation throughout mixing and spraying procedure.
3. Add PrePass A herbicide to the spray tank followed by PrePass B herbicide. Complete the filling of the spray tank.

Sprayer cleanup: Use method A on page 16 for cleanup procedure.

Safety information, see page 25

PrePass (cont'd)

8. **Application Tips: Spring and summer:** Warm, moist growing conditions promote active weed growth and enhance the activity of PrePass. Weeds hardened off by cold weather or drought stress may show delayed symptoms and result in reduced levels of control. Reduced control may occur when applied to weeds heavily covered in dust. **Fall:** Prepass can be applied until late October, but active weed growth must be present.
9. **How it Works:** PrePass A is taken up by leaves and stops growth of susceptible weeds rapidly via inhibition of the ALS enzyme. PrePass B is a non-selective systemic herbicide that moves through foliage into the roots, resulting in plant mortality.
10. **Expected Results:** Weeds susceptible to PrePass A will stop growing almost immediately. Newer leaves start to yellow and wilt, followed by a loss of green colour. Symptoms will spread to the rest of the plant with some weeds showing purpling or reddening. Under good growing conditions, complete control may occur within 7 - 10 days after application. Annual weeds susceptible to PrePass B will wilt and yellow within 2 - 4 days. Perennials will show similar symptoms within 5 - 10 days after application.
11. **Effects of Rainfall:** Heavy rainfall immediately after application may wash the chemical off the foliage, and a repeat application may be required. Do not apply if rainfall is forecast for time of application.
12. **Movement in Soil:** PrePass A is somewhat soluble in water, but generally not mobile in soil under typical prairie conditions. Dissipation of PrePass A occurs primarily through microbial degradation. Field studies in a wide variety of soils have shown the half-life of PrePass A in soil to range from 2 - 18 days. The amount of PrePass B leaching is very low.
13. **Cropping Restrictions:**

Drift: Do not allow spray mist to drift since drift can cause damage to non-target crops and plants. Do not apply when winds are gusty or in excess of 15 km/h. When spraying, avoid combinations of pressure and nozzle type that will result in fine particles (mist), which are more likely to drift.

Succeeding crops:

Pre-seed burn-down application: Fields treated with PrePass herbicide tank mix can be seeded to barley, oats or wheat in the year of application.

Summerfallow application: Fields treated with PrePass herbicide tank mix can be seeded to barley, canola, durum wheat, peas, wheat or summerfallowed the year after treatment.

Grazing restrictions: Do not graze treated areas within 7 days of application.
14. **Toxicity:** PrePass A has extremely low acute toxicity. Acute $LD_{50} = >6,000$ mg/kg. PrePass B has very low acute mammalian toxicity. Acute oral LD_{50} (rats) = 4,320 mg/kg. Eye irritant.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Store away from food, feedstuff, fertilizer, seeds, insecticides and fungicides or other pesticides or herbicides. Store in dry, heated storage. If products are frozen, bring to room temperature and agitate before use. Soak up small amounts of spill with absorbent clays.
17. **Resistance Management:** See page 41 for information on resistance management.

Prestige/Prestige XC

(fluroxypyr + clopyralid + MCPA ester)

Manufacturer: Dow AgroSciences Canada Inc.

Group 4



Danger Poison

1. Formulations:

Prestige A: 180 g/L fluroxypyr (PCP# 25465); 6.4 L jug.

Prestige B: 50 g/L clopyralid + 280 g/L MCPA Ester (PCP# 25464); 2 x 8.0 L jugs.

Prestige XC A: 333 g/L fluroxypyr (PCP# 29462); container size 3.3 L or in bulk 4 x (2 x 9.9 L).

Prestige/Prestige XC (cont'd)

Prestige XC B: 50 g/L clopyralid + 280 g/L MCPA ester as a co-formulation (PCP# 29465); 2 x 8.0 L jugs or bulk 4 x 96 L.

- 2. Registered Mixes:** Barley, spring wheat (including durum): Achieve Liquid (200 mL/ac) + Turbocharge adjuvant, Assert 300 SC (540 - 670 mL/ac) + acidulate, Puma120 Super (312 mL/ac for barnyard grass, green foxtail and wild oats). Spring wheat (including durum): Achieve 80DG (100 g/ac) + Turbocharge adjuvant, Everst 70 DF solupak (17.4 g/ac) + non-ionic surfactant, Horizon (95 mL/ac) + Score adjuvant, Puma120 Super (312 mL/ac for barnyard grass, green foxtail and wild oats).

3. Crops:

barley	crested wheatgrass*	meadow brome grass*	tall fescue
canary seed	durum wheat	smooth brome grass*	(established)
creeping red fescue*	intermediate wheatgrass*	spring wheat	timothy*

* Both seedling and established for seed production only.

- 4. Weeds Controlled:** The lower rate of Prestige A at 0.24 L/acre, Prestige B at 0.6 L/acre or Prestige XC A at 0.13 L/ac, Prestige XC B at 0.6 L/ac. Each package treats 27 acres/case or 640 acres/pallet bulk.

Canada thistle (light infestations)	flixweed**	shepherd's-purse (9.0)	volunteer flax (1 - 12 cm) (8.9)
cleavers (1 - 4 whorls) (8.7)	kochia	stinkweed (8.9)	volunteer sunflower
	lamb's-quarters	stork's-bill* (1 - 8 leaf) (8.3)	wild mustard (9.0)

The higher label rate of Prestige A at 0.32 L/acre, Prestige B at 0.8 L/acre or Prestige XC A at 0.17 L/acre, Prestige XC B at 0.8 L/acre controls all of the above plus the following weeds. Each package treats 20 acres / case or 480 acres/pallet bulk

annual sow thistle (8.7)	perennial sow thistle***	Russian pigweed	tartary buckwheat
Canada thistle (8.5) ***	redroot pigweed (8.5)	scentless chamomile	volunteer canola
common groundsel (8.9)	round leaved mallow	smartweed (8.4)	wild buckwheat (1-4 leaf) (8.7)
dandelion (8.0)**			

* Suppression only at low rate.

** Spring rosettes only.

*** Season long control, with some regrowth in the fall.

- 5. Weeds Suppressed at higher rate:** Common chickweed, hemp-nettle (2 - 6 leaf stage) (8.3).

6. When Used:

Crop stage: Cereals and canary seed: 3 leaf to just before flag leaf stage. Tall fescue (established): 4-leaf to flag leaf stage.

Weed stage: Actively growing and in seedling stage stage.

7. How to Apply:

With: Ground equipment. **Do not apply by air.**

Rates:

Prestige A: 0.24 L/acre; **Prestige B:** 0.6 L/acre or **Prestige XC A:** 0.13 L/acre; **Prestige XC B:** 0.6 L/acre.

Prestige A: 0.32 L/acre; **Prestige B:** 0.8 L/acre or **Prestige XC A:** 0.17 L/acre; **Prestige XC B:** 0.8 L/acre.

Water volume: 40 L/ac.

Pressure: 200 - 270 kPa.

Nozzles: Flat fan type.

Mixing instructions: Use only sprayers with good agitation. Ensure that sprayer is properly cleaned prior to applying Prestige.

1. Fill the sprayer with half the required amount of clean water, start agitation and continue agitation throughout the mixing and spraying procedure.
2. Add required amount of Prestige A and then Prestige B.
3. Complete filling the sprayer tank.

- 8. Application Tips:** Prestige is a non-residual herbicide and will only control emerged weeds. Prestige activity is influenced by weather conditions. Optimum activity requires active weed growth. Temperature range for optimum activity is 12°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost before application (3 days) or shortly after (3 days) may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions, e.g. heat, drought or cold, or if weeds have initiated flowering or if heavy infestations exist. Wet foliage at time of application may result in reduced weed control. Optimum timing of application is 2 - 4 leaf stage of weeds. **Do not apply to wheat and barley underseeded to legumes.** Make only one application per year. Do not apply before 3 leaf stage or later than flag leaf stage of crop.
- 9. How it Works:** Prestige herbicide tank mix does not control weeds that have not emerged at the time of application. The components of Prestige tank mix move within the plant to control exposed and underground plant tissue. The herbicide mimics naturally occurring plant hormones and controls weeds by disrupting normal plant growth patterns. Symptoms include twisting of stems and swollen nodes.
- 10. Expected Results:** Weeds start to twist shortly after being sprayed. After twisting and bending, plants stop growing, turn brown and die. Difficult-to-control weeds such as Canada thistle and wild buckwheat stop growing, change colour to dark green and then turn yellow. Death may not occur for 14 - 21 days. Some weak Canada thistle regrowth may occur by the end of season.
- 11. Effects of Rainfall:** Do not apply if rain is expected within 6 hours.
- 12. Movement in Soil:** Prestige A/Prestige XC A are bound tightly to soil organic matter but not readily bound to sand, silt or clay. Due to the relatively short half life of Prestige A, it rarely moves deeper than 15 cm in soil. Prestige B is made up of MCPA and clopyralid. MCPA is readily leached from soil. Clopyralid is somewhat soluble in water, but is generally not mobile in soil under typical prairie conditions.
- 13. Cropping Restrictions:** Do not harvest the treated mature crop within 60 days after application.
- Succeeding crops:** Fields treated with Prestige herbicide tank mix can be seeded the following year to barley, canola, flax, forage grasses, mustard, oats, peas, rye, wheat or summerfallowed.
- Very dry soil conditions following application can result in a risk of injury to field peas grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive in the year of application (less than 140 mm rain between June 1 and August 31 or less than 175 mm rain in the whole year) delay seeding field peas an additional 12 months (22 months following application). Contact your local Dow AgroSciences representative or retailer for more information before seeding field peas following drought conditions in the previous year.
- Do not seed crops other than those listed above for at least one year after treatment.
- Drift:** Broadleaf crops are sensitive to spray drift. Minimize drift by using nozzles that put out sufficient spray volume and large droplets.
- Grazing restrictions:** Do not cut or graze fields of treated wheat or barley within 7 days after application.
- 14. Toxicity:**
- Prestige A:** Very low mammalian toxicity. Acute oral LD₅₀ (rats) = >2,000 mg/kg.
- Prestige B: Clopyralid:** Very low acute mammalian toxicity. Acute LD₅₀ (rats) = >2,000.
- MCPA:** Moderate acute mammalian toxicity. Acute oral LD₅₀ (rats) = technical 700 - 800 mg/kg. May cause burns upon contact with skin and eyes and can be absorbed through the skin.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Store in a dry, heated area. If product is frozen, bring to room temperature and agitate before use.
- 17. Resistance Management:** See page 41 for information on resistance management.

Primextra II Magnum

(metolachlor + atrazine)

Group 15,5

Manufacturer: Syngenta Crop Protection Canada Inc.

1. **Formulations:** Flowable; 400 g/L S-metolachlor + 313 g/L atrazine + 7.0 g/L related active triazines (PCP# 25730); 1 x 14 L jug.
2. **Registered Mixes:** Nitrogen fertilizer solutions may replace all or part of the water carrier on preplant applications.
3. **Crops:** Field corn, silage corn, sweet corn.
4. **Weeds Controlled:**

American nightshade	fall panicum	purslane	witch grass
annual smartweed	green foxtail	ragweed	yellow foxtail
barnyard grass	lady's-thumb	redroot pigweed	yellow nutsedge
crabgrass	lamb's-quarters	wild buckwheat	
eastern black nightshade	prostrate pigweed	wild mustard	
5. **Weeds Suppressed:** None.
6. **When Used:** Spring applied: pre-plant incorporated or banded. Pre-emergent (under irrigation only).
7. **How to Apply:**

With: Ground equipment.

Rate: 1.2 - 1.6 L/ac. Infestation Level: Light 1.2 L/ac; Medium 1.4 L/ac; Heavy 1.6 L/ac.

Water volume: 60 - 120 L/ac.

Pressure: 200 - 300 kPa.

Nozzles: Use metal filters and screens 50 mesh or larger.

Incorporation: Broadcast and lightly harrow before planting. Do not exceed 5 cm depth. Band treatment: mount a press wheel ahead of the nozzle to level the band.
8. **Application Tips:** For best results, apply PRIMEXTRA II Magnum herbicide/fertilizer mixtures uniformly to the soil with properly calibrated equipment immediately after blending and incorporate according to label directions.
9. **How it Works:** Absorbed by roots and inhibits photosynthesis.
10. **Expected Results:** Weeds die at germination or under dry conditions, die-back soon after emergence.
11. **Effects of Rainfall:** Enhances results.
12. **Movement in Soil:** Some movement may occur if there is excess moisture on light soils.
13. **Cropping Restrictions:** Follow corn with corn only.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) = atrazine 3,080 mg/kg, metolachlor = 2,780 mg/kg, Primextra = 4,680 mg/kg. May cause severe skin irritation and perhaps eye injury. Low toxicity to fish and birds. Intake may cause convulsions and coma.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Dry heated storage preferred.
17. **Resistance Management:** See page 41 for information on resistance management.

Princep Nine-T (simazine)

Group 5

Manufacturer: Syngenta Crop Protection Canada Inc.



Caution Poison

1. Formulations: Water dispersible granule; 89% simazine + 1% related triazines (PCP# 16370); 5 x 5 kg bag.

2. Registered Mixes: None.

3. Crops:

alfalfa (estab.) (8.5)*	cherry	low bush blueberries	raspberries
apples	Christmas tree plantings	nursery stock (estab.)*	shelterbelts (estab.)*
apricots	field corn	peaches	sweet corn
asparagus	high bush blueberries	pears	woody ornamentals (estab.)
bird's-foot trefoil (estab.)	loganberries	plums	woodland tree plantings
blackberries			

* Established – at least 1 year old.

4. Weeds Controlled:

annual smartweeds	lady's-thumb	purslane	wild buckwheat
barnyard grass	lamb's-quarters	ragweed	wild oats
crabgrass	perennials (most seedling)	volunteer clovers	yellow foxtail

5. Weeds Suppressed: None.

6. When Used: Prior to weed emergence. May be applied in either the spring or fall, prior to freeze-up.

Alfalfa, bird's-foot trefoil: Late fall. **Asparagus, blueberries:** Early spring.

Corn: Apply one week prior to seeding or within 4 days after seeding.

Raspberries: Early spring but not on young shoots.

Shelterbelts (established): Fall or in spring prior to weed emergence.

7. How to Apply:

With: Ground equipment.

Rate: (On established stands only: at least 1 year old)

Crop	Princep Nine-T
Alfalfa, bird's-foot trefoil	0.45 kg/ac
Asparagus, blackberries, high bush blueberries, nursery stock, woody ornamentals	1 - 1.5 kg/ac
Corn	0.6 - 1 kg/ac
Loganberries	1.5 - 2.4 kg/ac
Low bush blueberries	0.6 - 0.8 kg/ac
Non-bearing fruit trees (first year) apples, apricot, cherry, peach, pear, plum	0.45 - 0.9 kg/ac
Raspberries	0.8 - 1 kg/ac
Shelterbelts (1 year or older), Christmas tree, woodland plantations	2 - 2.8 kg/ac

Water volume: 120 L/ac. Shelterbelts: 200 L/ac.

Pressure: 275 kPa.

Nozzles: Use nozzle screens of 50 mesh or larger.

Incorporation: In corn, Princep may be applied 1 week before seeding and incorporated to a depth of 2.5 cm.

8. Application Tips: Gentle agitation required during mixing and spraying. After any break in the spray application, agitate thoroughly. Do not overlap application. Alfalfa, bird's-foot trefoil: Do not apply to same field for more than 3 consecutive years. Do not apply Gramoxone within 1 year after the Princep application.

Princep Nine-T (cont'd)

- 9. How it Works:** Acts through the roots of germinating weeds and inhibit photosynthesis.
- 10. Expected Results:** Weed-free ground.
- 11. Effects of Rainfall:** Negligible.
- 12. Movement in Soil:** Very little movement is possible on clay soil, but on sandy ground with high rainfall, some leaching may occur.
- 13. Cropping Restrictions:**
Succeeding crops: Plant only corn in the treated area in the same year. Breakdown of simazine in the soil is slow and may cause injury to sensitive crops (e.g. cereals, canola, sugar beets, white beans, onions, peas, tomatoes, turnips) one or more years after application. The risk of damage to succeeding crops from simazine residues may be reduced by ploughing or deep tilling treated fields in the fall prior to seeding the next crop in the rotation. Spreading and incorporating manure may also help to reduce the simazine levels. Uneven application, excessive sprayer overlap or applications in excess of recommended rates will result in a longer carry-over of simazine residues. A prolonged period of hot dry weather will also lengthen the time that simazine residues remain in the soil.
Grazing restrictions: Allow 30 days between application and grazing of dairy, beef cattle, and sheep and 60 days between application and cutting for hay.
- 14. Toxicity:** Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) = technical 5,000 mg/kg, Princep Nine-T = 5,000 mg/kg. May be irritating to eyes and cause dermatitis.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Store in dry area, heating not required.
- 17. Resistance Management:** See page 41 for information on resistance management.

Prism (*rimsulfuron*)

Manufacturer: E.I. duPont Canada Co.

Group 2

Caution Poison

1. Formulations: Dry flowable; 25% (PCP# 23983); 480 g.**2. Registered Mixes:** None.**Surfactants:** Citowett Plus, Agral 90 or Ag-Surf.**3. Crops:** Potatoes (irrigated).**4. Weeds Controlled:**barnyard grass
fall panicumgreen foxtail
quackgrassredroot pigweed
witch grass

yellow foxtail

5. Weeds Suppressed: Lamb's-quarters.**6. When Used:****Crop stage:** Post-emergent, prior to the initiation of flowering.**Weed stage:** Annual grasses: 1 - 6 leaf stage, maximum 2 tillers. Quackgrass: 3 - 6 leaf stage (less than 10 inches leaf extended). Broadleaf weeds: 4 - 6 leaf stage. Apply to young, actively growing broadleaf weeds before the canopy closes. Weeds emerging after treatment may not be controlled.**7. How to Apply:****With:** Ground equipment. Do not apply by air.**Rate:** 24 g/ac plus 2 L of surfactant per 1,000 liters of spray solution.**Water volume:** 40 L/ac.

Safety information, see page 25

Prism (cont'd)

Pressure: 175 - 275 kPa.

Nozzles: Use flat fan nozzles. Use 50 mesh screens or larger.

Mixing instructions: Use mixing instructions "a" on page 12.

Sprayer cleanup: To avoid injury to susceptible crops, thoroughly clean sprayer immediately after spraying. Ammonia must be used to deactivate Prism when cleaning. Use cleaning method A on page 16.

- 8. Application Tips:** During periods of stress, plants are not actively growing. When daytime temperatures, before or following application, are very hot combined with very dry conditions and low humidity, plants are under stress. Application of Prism during these periods may result in substantially reduced control. Do not apply to crop that is stressed by severe weather conditions, frost, low fertility, drought, water saturated soil, disease or insect damage as crop injury may result.
- 9. How it Works:** Prism is absorbed through the foliage and inhibits cell elongation.
- 10. Expected Results:** Rapid cessation of weed growth; initial development of leaf chlorosis within 5 - 7 days after application. Discolouration of dying weeds may not be noticeable for 2 - 3 weeks after application, depending on growing conditions and weed susceptibility. Application to potatoes may result in temporary foliar symptoms (discolouration of younger leaves and pinching of the terminal leaf) that may be confused with symptoms of a viral disease. Early application timing may reduce the likelihood of foliar symptoms.
Poor results may be expected if improper mixing, timing, coverage or when weeds are under stress.
- 11. Effects of Rainfall:** Rainfall within 2 - 4 hours of application may lessen degree of weed control.
- 12. Movement in Soil:** The soil mobility of Prism and its degradation products are negligible. Prism degrades rapidly in soil, regardless of soil type.
- 13. Cropping Restrictions:** Pre-harvest interval: 30 days. Make only one application per year.
Minimum crop rotation guidelines: The minimum interval is the time from the last application of Prism to the date of planting the rotational crop.
Interval prior to planting (months after application):
4 months: winter wheat.
10 months: barley, soybeans, white beans, red clover, sorghum, potatoes, field corn. All other crops, field bioassay.
Grazing restrictions: Do not graze the treated crops or cut for hay; sufficient data is not available to support such use.
- 14. Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) is >5,000 mg/kg.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Store in a cool, dry, well ventilated room.
- 17. Resistance Management:** See page 41 for information on resistance management.

Pulsar (fluroxypyr + dicamba)

Manufacturer: Syngenta Crop Protection Canada Inc.

Group 4

Formulations:

Product	Active Ingredient	Formulation	Container size
Syngenta	Fluroxypyr	EC 113.3 g/L as	2 x 9.8 L and 5 x 78.6 L
Syngenta	Dicamba	EC 86.9 g/L as diglycioamine salt	

Crops and Staging

Crop	Staging (Zadoks Growth Stage)
Spring and durum wheat, barley	2 - 5 Leaf crop stage

Pulsar (cont'd)**Weeds Controlled, Rates and Staging**

Weed stage: leaf stage, unless otherwise noted in the weed table

Rates**Weeds controlled****Pulsar applied at 246 ml/ac**

Cleavers

Kochia

Wild Buckwheat (1-4L)

Pulsar applied at 371 ml/ac

All of the above PLUS

Russian Thistle

Volunteer Flax

Lamb's Quarters (Suppression)

Stork's Bill (Suppression)

Wild Buckwheat (up to 9L)

Redroot Pigweed (Suppression)

MCPA Ester 500 Tank-mix

All of the above PLUS

Flixweed**

Prickly Lettuce

Shepherd's Purse

Burdock

Mustard's (except dog and green

Ragweeds

Stinkweed

Cow Cockle

tansy)

Russian Pigweed

** Flixweed susceptible at seedling stage only, top growth control only

Tank Mixes

Herbicide tank mix partner	Crops registered	Rate of herbicide tank mix partner	Remarks
MCPA Ester 500	Barley, spring and durum wheat	283 ml/ac	
Horizon NG*	Spring and durum wheat	376 ml/ac	
Horizon 240EC*	Spring and durum wheat	95 ml/ac	Add Score to Horizon 240EC @ 0.8 v/v

* Do not use Horizon NG and Horizon 240EC on barley

Application Information:

Water volume: Ground (45 L/acre). Do not apply by air.

Nozzle: 80° or 110° flat fan nozzles are recommended for optimal spray coverage. Use 50 mesh nozzle screens. Do not use flood type nozzles, controlled droplet application equipment, spray foils or hollow cone nozzles.

Pressure: 275 – 310 kPa

Application Tips

Do not tank mix with any other adjuvant, chemical additives, pesticides or fertilizers unless recommended on this label. For optimum results, apply Pulsar to actively growing weeds. An early application will maximize crop yields by reducing weed competition. Weeds emerging after application of Pulsar will not be controlled.

Weed control following application of Pulsar alone or in combination with tank mix partners can be reduced or delayed under stress conditions such as drought, heat, insufficient fertility, flooding or prolonged cool temperatures. Optimum weed control will be obtained if application of Pulsar is delayed until the stress conditions have ended and weeds are once again actively growing.

How it Works

Pulsar is a systemic, post-emergence herbicide for the selective control of cleavers, wild buckwheat, kochia, Russian thistle, redroot pigweed (suppression only), lamb's quarters (suppression only), volunteer flax, stork's bill (suppression only) in spring wheat, durum wheat and barley in western Canada. Pulsar moves within the plant to control both exposed and underground plant tissues. The product controls weeds by disrupting normal plant growth patterns. Symptoms include epinasty (twisting of the stems) and swollen nodes.

Expected Results

Weeds: Can take up to 7 - 10 days depending on weather and growing conditions. Leaves curl, leaf edges turn brown, petioles twist, plant ceases growth and turns brown and dies.

Crop: Improper or untimely application can result in abnormal bending at the nodes of grain stalks, difficulty in head emergence from sheath, curled awns, malformed kernels and sterile florets. Under certain conditions, straw shortening may occur but yield will not be affected. Poor results may be expected if there is poor coverage, rainfall less than 1 hour after application or weeds are too advanced.

Effect of Rainfall: Pulsar alone can be used one hour before rainfall.

Pulsar (cont'd)

Restrictions

One application per year is permitted. Apply when crop is in the 2-5 leaf stage.

Re-cropping: Fields previously treated with Pulsar can be seeded the following year to barley, canola, flax, forage grasses, lentils, mustard, oats, peas, rye or wheat or fields can be summerfallowed.

Grazing:

Pre-harvest Intervals: Do not harvest the treated crop within 60 days after application. Do not graze cattle on treated crop, or harvest for silage until 7 days following the application of Pulsar alone and at least 12 weeks following treatment with Pulsar tank-mixes.

Drift: For field sprayer application, buffer zones can be reduced with the use of drift reducing spray shields. When using a spray boom fitted with a full shield (shroud, curtain) that extends to the crop canopy, the labelled buffer zone can be reduced by 70%. When using a spray boom where individual nozzles are fitted with cone-shaped shields that are no more than 30 cm above the crop canopy, the labelled buffer zone can be reduced by 30%. For tank mixes, consult the labels of the tank-mix partners and observe the largest (most restrictive) buffer zone of the products involved in the tank mixture and apply using the coarsest spray (ASAE) category indicated on the labels for those tank mix partners.

Buffer zone guideline: Terrestrial Habitats: 15 meters, Aquatic Habitats: 15 meters

Toxicity

Dicamba: Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = 2,629 mg/kg. Fluroxypyr has very low mammalian toxicity. Acute oral LD₅₀ is >2,000 mg/kg.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.

Puma¹²⁰ Super/Puma Advance/ Wildcat/Bengal/Cordon



Warning Poison

Manufacturer: Bayer CropScience Inc./MANA Inc./Viterro

Group 1

Formulations:

Product	Company	Active ingredient	Formulation	Container size
Puma ¹²⁰ Super (PCP# 25864)	Bayer CropScience	120 g/L fenoxaprop-p-ethyl	EC	4 L, 6.2 L, 99.3 L, 800 L & Bulk
Bengal* (PCP# 29268)	Viterro	120 g/L fenoxaprop-p-ethyl	EC	2 x 6.2L, 99.3 L pod
Wildcat (PCP# 29151)	MANA Inc.	120 g/L fenoxaprop-p-ethyl	EC	12.4L, 312 L, 624 L
Cordon (PCP# 29494)	Nufarm Agriculture Inc.	120 g/L fenoxaprop-p-ethyl	EC	18.6 L jug
Puma Advance (PCP# 29488)	Bayer Crop Science	90 g/L fenoxaprop-p-ethyl	EC	8.25 L jug, 1000 L shuttle

*Bengal is registered only for use on wheat. Do Not use on barley

Crops and Staging

Crops	Recommended stage
Spring and durum wheat	1 - 6 leaves on main stem plus 3 tillers. (Zadoks 11-16,23)
Barley ^{1,2}	1 - 5 leaves on main stem plus 2 tillers. (Zadoks 11-15,22)
Perennial rye grass (seed production only)	2 - 4 leaf stage

¹ Do not apply Puma¹²⁰ Super/Wildcat alone in barley. Always tank mix with a registered broadleaf partner. **Note:** Initial crop injury may be observed after application, but this is temporary and should not affect yield. This injury is most likely to occur when applications are made under stress conditions or when applications are made past the recommended leaf stage. Severe crop injury will occur as a result of spray overlap.

² Puma¹²⁰ Super, Cordon and Wildcat are registered for use in barley. Do not use Bengal in barley.

Puma¹²⁰ Super/Puma Advance/Wildcat/Bengal/Cordon (cont'd)

Weeds and Staging

Grassy weeds	Stage	Rate	Area treated per 6.2 L jug (8.25 L)
Low wild oat infestation	1-6 leaf (up to emergence of 3rd tiller)	268 mL/ac, 412 mL/ac Puma Advance ³	23.1 acres (20 acres)
Moderate to heavy wild oat infestation	1-6 leaf (up to emergence of 3rd tiller)	312 mL/ac, 412 mL/ac Puma Advance ³	20 acres (20 acres)
Green foxtail (wild millet)	1-6 leaf (up to emergence of 3rd tiller)	156 mL/ac, 412 mL/ac Puma Advance ³	40 acres (20 acres)
Yellow foxtail	1-6 leaf (up to emergence of 3rd tiller)	312 mL/ac, 412 mL/ac Puma Advance ³	40 acres (20 acres)
Barnyard grass	1-6 leaf (up to emergence of 3rd tiller)	312 mL/ac, 412 mL/ac Puma Advance ³	40 acres (20 acres)

³NOTE: No reduced rate registered for Puma Advance. Puma Advance rate is 412 mL/acre for all susceptible grassy weeds.

Tank Mixes

Tank-mix partner	Tank mix partner rate	Puma ¹²⁰ Super/Wildcat/Cordon/ Bengal* rate	
		Wild oat, green foxtail, yellow foxtail, barnyard grass	Green foxtail only - no reduced rate using Puma Advance
Spring wheat, durum wheat and barley			
2,4-D 600 ester	283 mL/acre	312 mL/acre (412 mL/acre) ³	156 mL/acre
2,4-D 700 LV ester	243 mL/acre	312 mL/acre (412 mL/acre) ³	156 mL/acre
Ally	2.0 – 3.0 g/acre	312 mL/acre (412 mL/acre) ³	156 mL/acre
Attain: Attain A + Attain B	243 mL/acre + 405 mL/acre	312 mL/acre (412 mL/acre) ³	156 mL/acre
Buctril M	405 mL/acre	312 mL/acre (412 mL/acre) ³	156 mL/acre
Curtail M	606 - 808 mL acre	312 mL/acre (412 mL/acre) ³	156 mL/acre
Dichlorprop D	708 mL/acre	312 mL/acre (412 mL/acre) ³	156 mL/acre
DyVel	500 mL/acre	No	156 mL/acre
Estoprop	710 mL/acre	312 mL/acre (412 mL/acre) ³	156 mL/acre
Express Pack: Express + 2,4-D 700 LV	4.0 g/acre + 243 mL/acre	No	156 mL/acre
Frontline: Frontline A + Frontline B	40 mL/acre + 335 mL/acre	No	156 mL/acre
Infinity	335 mL/acre	312 mL/acre (412 mL/acre) ³	156mL/acre
MCPA 500 amine	340 mL/acre	312 mL/acre (412 mL/acre) ³	156 mL/acre
MCPA 500 ester	340 mL/acre	312 mL/acre (412 mL/acre) ³	156 mL/acre
Mecoprop	2.2 – 2.8 L acre	312 mL/acre (412 mL/acre) ³	156 mL/acre
Prestige: Prestige A + Prestige B	324 mL/acre + 810 mL/acre	312 mL/acre (412 mL/acre) ³	156 mL/acre
Refine SG	8 g/acre	312 mL/acre (412 mL/acre) ³	156 mL/acre
Refine SG + Buctril M	7.7 g/acre + 400 mL/acre	312 mL/acre (412 mL/acre) ³	156 mL/acre
Refine SG + MCPA 500 ester	8 g/acre + 340 mL/acre	312 mL/acre (412 mL/acre) ³	156 mL/acre
Spectrum: Frontline A + Spectrum B	40 mL/acre + 600 mL/acre	No	156 mL/acre

³NOTE: No reduced rate registered for Puma Advance. Puma Advance rate is 412 mL/acre for all susceptible grassy weeds.

*Bengal not to be used with barley.

Safety information, see page 25

Puma¹²⁰ Super/Puma Advance/Wildcat/Bengal/Cordon (cont'd)

Tank-mix partner	Tank mix partner rate	Puma ¹²⁰ Super/Wildcat/Cordon/ Bengal* rate	
		Wild oat, green foxtail, yellow foxtail, barnyard grass	Green foxtail only - no reduced rate using Puma Advance
Thumper	405 mL/acre	312 mL/acre (412 mL/acre) ³	156 mL/acre
Triton: Refine SG + Accord	8 g/acre + 27 g/acre	312 mL/acre (412 mL/acre) ³	No
Trophy: Trophy A + Trophy B	243 mL/acre + 453 mL/acre	312 mL/acre (412 mL/acre) ³	156 mL/acre
Turboprop 600	710 mL/acre	312 mL/acre (412 mL/acre) ³	156 mL/acre
Unity: Unity 280 EC + Unity 75 WG	202 mL/acre + 4.3 g/acre	312 mL/acre (412 mL/acre) ³	156 mL/acre
Spring and durum wheat only			
Attain: Attain A + Attain B	243 mL/acre + 404 mL/acre	312 mL/acre (412 mL/acre) ³	156 mL/acre
DyVel DSp	440 mL/acre	312 mL/acre (412 mL/acre) ³	156 mL/acre
Lontrel 360	170 mL/acre	312 mL/acre (412 mL/acre) ³	156 mL/acre
Lontrel 360 + MCPA 500 ester	170 mL/acre + 340 mL/acre	312 mL/acre (412 mL/acre) ³	156 mL/acre
Mecoprop-p		312 mL/acre (412 mL/acre) ³	156 mL/acre

³ NOTE: No reduced rate registered for Puma Advance. Puma Advance rate is 412 mL/acre for all susceptible grassy weeds.

*Bengal not to be used with barley.

Application Information

How to Apply: Ground and air.

Water Volume: Ground: 23 – 45 L/acre. Use higher water volume for dense canopies. **Air:** 13.5 L/acre.

Nozzles: Only 80° and 110° Flat fan is recommended. **Pressure: Air:** no less than 300 kPa or less; **Ground:** 275 kPa.

Application Tips

Application beyond the 6 leaf stage in spring wheat, durum wheat or barley may result in injury. Early application is important to maintain crop safety. Initial crop injury in the form of shortening or discoloration may be observed after application. Barley tends to be more susceptible to this injury than wheat. This condition is temporary and should not effect yield. Injury is more likely to occur when Puma¹²⁰ Super/Wildcat/Bengal/Cordon/Puma Advance is not tank mixed or when applied past the recommended leaf stage or when applications are made under certain stress conditions, such as cold and moist conditions.

Under stressed conditions and/or heavy crop canopy, early application will result in improved grassy weed control. If another pesticide has already been applied, wait 7 days before applying Puma¹²⁰ Super/Puma Advance /Wildcat/Bengal/Cordon, or following application of Puma¹²⁰ Super/Puma Advance/Wildcat/Bengal/Cordon, a 4 day interval is required before applying another pesticide, except for those recommended label. During periods of stress, plants are not actively growing. When daytime temperatures before or after application are very hot, combined with very dry conditions and low humidity, plants are under stress. Application of Puma¹²⁰ Super/Puma Advance /Wildcat/Bengal/Cordon during these periods may result in reduced weed control (and/or crop injury).

How it Works

Fenoxaprop-p-ethyl is a contact as well as systemic herbicide. It has no soil residual activity. Regions of high meristematic activity, such as root and shoot tips are known to be affected.

Expected Results

Reduction of leaf growth and chlorosis blotching within 1 – 3 days after application. Initial development of leaf chlorosis within 5 – 8 days after application and complete death within 14 – 21 days.

Restrictions

Effect of Rainfall: Do not apply if rain is expected within 1 hour after spraying.

Grazing: Do not graze the treated crops or cut for hay within 25 days of application, or harvest for grain within 65 days of application. Do not graze treated perennial ryegrass or cut for straw within 65 days of application.

Re-cropping: No restrictions the year after application.

Safety information, see page 25

Puma¹²⁰ Super/Puma Advance/Wildcat/Bengal/Cordon (cont'd)**Environmental Hazards**

Puma¹²⁰ Super/Puma Advance/Wildcat/Bengal/Cordon is toxic to fish, daphnids, aquatic plants, terrestrial plants and some terrestrial invertebrates. Avoid contamination of aquatic systems during application. Do not contaminate these systems through direct application, disposal of waste or cleaning equipment. Leave 3 meters from the downwind edge of the spray boom to water or wetland areas (i.e. lakes, rivers, sloughs, ponds, coulees, prairie potholes, creeks, marshes, streams, reservoirs, and wetlands) by ground or air. Leave 10 meters by ground and 33 meters by air from the downward edge of boom to sensitive non-target terrestrial areas (i.e. grasslands, forested areas, shelterbelts, woodlots, hedgerows, pastures, rangelands, and shrublands).

Toxicity

Moderate acute mammalian toxicity. May cause burns upon contact with skin and eyes, and it can be absorbed through the skin.

Storage

If stored for 1 year or longer, shake well before using.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.

Pursuit/Multistar (imazethapyr)**Group 2**

Manufacturer: BASF Canada/Viterra

- Formulations:** Pursuit – Imazethapyr, aqueous solution; 240 g/L (PCP# 23844); 3.3 L container.
Multistar – Imazethapyr, aqueous solution; 240 g/L (PCP# 29259); 3.3 L container

2. Registered Mixes:

Field peas: Poast Ultra[®], at 190 mL/ac + Merge at 1 L/100 L water volume.

Seed alfalfa (seedling and established) and dry beans: None.

[®] Pursuit only

Surfactants: Pursuit/Multistar alone:

Non-ionic surfactant (minimum of 80% active ingredient) such as Ag-Surf or Agral 90 or Surf 92 (added at the rate of 0.25% of the water volume).

Tank mixes: With Poast Ultra, add Merge at 1 L/100 L water volume; Check Poast Ultra, Select and Venture label for recommendations. **The surfactant is not included in the package.**

Mixing instructions: For Pursuit/Multistar alone: Fill sprayer tank with 1/2 the required amount of water. Add the required amount of Pursuit/Multistar herbicide while agitating, followed by the required amount of surfactant. Add remainder of water. For tank mixes, check Poast Ultra, Select and Venture label for recommendations.

Mixing rates: See Poast Ultra for tank mixing rates.

- Crops:** Alfalfa (seedling and established) grown for seed, chickling vetch and grass pea (seed production only), field peas, common dry beans (pink, pinto and red).
- Weeds Controlled:**

Chickling vetch, grass pea, field peas: Chickweed, cleavers, green foxtail, hemp-nettle, redroot pigweed, shepherd's-purse, smartweed, stinkweed, volunteer canola, wild mustard, wild oats.

Dry beans: Hairy nightshade.

Established alfalfa (seed): Redroot pigweed, stinkweed, wild mustard, volunteer canola.

Seedling alfalfa (seed): Redroot pigweed, smartweed, stinkweed, volunteer canola, wild mustard.

Safety information, see page 25

Pursuit/Multistar (cont'd)

- 5. Weeds Suppressed:** Common groundsel, shepherd's-purse, green foxtail, wild buckwheat.
- 6. When Used:**
- Crop stage:** Field peas: up to and including the 6th node stage. Established alfalfa (for seed production only): 1 - 4 trifoliate leaf stage of alfalfa; apply before alfalfa reaches 30 cm in height. Seedling alfalfa, apply only in the year of establishment and only one application of Pursuit/Multistar during the life of the alfalfa stand, on stands that will remain for 3 years or more. In established alfalfa stands used for seed production only, do not make more than one application per year and do not apply in the last year of the alfalfa stand. Chickling vetch/green pea: 5 - 7 leaf stage. Dry beans: Up to and including the second trifoliate.
- Weed stage:** Apply early post-emergence, up to the 4 true leaf stage of actively growing weeds. Wild oats: 2 - 4 leaf stage. Hairy nightshade: up to 6 leaf stage.
- 7. How to Apply:**
- With:** Ground equipment only.
- Rate:** 85 mL/ac.
- Surfactant:** 1 L non-ionic surfactant/400 litres of spray solution when using Pursuit alone.
- Water volume:** 40 - 160 L/ac.
- Pressure:** 275 kPa.
- Nozzles:** Flat fan recommended; tilted 45° forward for better penetration. 50-mesh screens and filters.
- Incorporation:** Not applicable.
- 8. Application Tips:** Do not spray Pursuit/Multistar if temperatures of +5°C or lower are forecasted within 3 days of application. Temperatures near freezing (below 5°C) will prevent optimum herbicide performance, as weeds are not actively growing.
- 9. How it Works:** Absorbed by foliage and roots. Disrupts plant metabolism causing growth to stop. Works best under good growing conditions.
- 10. Expected Results:** Susceptible weeds stop growing within 24 - 48 hours. Yellow striping and purplish or reddish discolouration of the leaves may occur. Leaves begin to die in 3 - 10 days starting with the youngest and moving to the older leaves. Death of the plant may occur in 1 - 3 weeks.
- 11. Effects of Rainfall:** Rainfall within 6 hours of application may reduce activity.
- 12. Movement in Soil:** Is not leached appreciably.
- 13. Cropping Restrictions:** Only one application of Pursuit/Multistar may be made during the season. Do **NOT** use in the brown or dark brown soil zones (except for use in dry beans and alfalfa under irrigated brown soils); rotational crops may be severely injured due to carryover in these soils.
- Field peas:** May be fed to livestock 30 days after application.
- Alfalfa:** May be grazed or harvested for forage 14 days after application.
- Minimum interval to harvest:** Field peas: 60 days; Clearfield canola 70 days; dry beans: 75 days; chickling vetch/green pea: 60 days.
- Succeeding crops: Black, Grey Wooded and Irrigated Brown soil zones:** Spring wheat, Clearfield canola, field peas, lentils and alfalfa may be planted the season following a Pursuit/Multistar application. Barley may be planted in the black and grey wooded soil zones the season following application. For other crops call BASF at 1-877-371-2273. Perform a field bioassay on other crops prior to planting them on a field-scale. In case of crop failure, replant only to Clearfield canola or field peas the year of application.
- 14. Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) 5,000 mg/kg. Non-toxic to fish, birds and bees.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Store at temperatures above 0°C. If product is exposed to temperatures below 0°C during shipment or storage, make sure the product has thawed completely and shake container vigorously.
- 17. Resistance Management:** See page 41 for information on resistance management.

Pyramin (pyrazon)

Group 5

Manufacturer: BASF Canada



Caution Poison

1. **Formulations:** Flowable formulation; 430 g/L (PCP# 15857); 3 L jugs.
2. **Registered Mixes:** Avadex BW, TCA or Ro-Neet, Nortron SC.
Surfactants: Super Spreader.
3. **Crops:** Sugar beets.
4. **Weeds Controlled:**

black nightshade	oak-leaved goosefoot	shepherd's-purse	wild carrot
chickweed	prostrate pigweed	smartweed	wild mustard
knotweed	purslane	stinkweed	wormseed mustard
lady's-thumb	ragweed	wild buckwheat	yellow rocket
lamb's-quarters	redroot pigweed		
5. **Weeds Suppressed:** None.
6. **When Used:** Pyramin may be used as a pre-plant incorporated, pre-emergent or post-emergent treatment. Post-emergent treatments should be applied before the weeds have 3 leaves.
7. **How to Apply:**
With: Ground equipment.
Rate: Light soils: 3.3 L/ac. Heavy soils: 4.1 L/ac. Nortron tank mix – Pyramin: 2.12 L/ac + Nortron SC: 1.48 L/ac.
Water volume: 40 - 101 L/ac.
Pressure: 275 - 350 kPa.
Nozzles: All standard low pressure nozzles delivering 40 - 101 L/ac.
Incorporation: Pre-plant – incorporate shallow. Fall ridging – apply Pyramin in a 17.5 cm band and cover with a 15 - 20 cm high ridge of soil. In the spring, level the ridges and leave guide marks to enable planting the bands. Avoid levelling deeper than the chemical placement.
8. **Application Tips:** Pyramin must not be mixed into soil deeper than seed is planted to reduce beet injury.
9. **How it Works:** The active ingredient in Pyramin is absorbed by the roots and is translocated to the leaves.
10. **Expected Results:**
Weeds: If adequate moisture is present, the weeds will fail to emerge. If the soil is dry for a long time, weeds that emerge and become well established will not be fully controlled, but small emerged weeds may die back, once adequate moisture is present.
11. **Effects of Rainfall:** No effect.
12. **Movement in Soil:** Pyramin does not move readily in the soil and cannot be leached out.
13. **Cropping Restrictions:** None.
Drift: Care should be taken to avoid drift onto sensitive plants such as rapeseed and mustard.
Grazing restrictions: The tops of beets grown in Pyramin treated soil may be used for human consumption or fed to livestock.
14. **Toxicity:** Very low acute mammalian toxicity. Oral LD₅₀ (rats) = 3,030 mg/kg. No short term or long term human health problems are associated with this product when used according to label. Non-toxic to bees.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Store in a cool, dry place. Do not store below 0°C.

Refine M/Broadside

(thifensulfuron methyl + tribenuron methyl + MCPA ester)

Group 2,4

Manufacturer: E.I. duPont Canada Co./Viterro



Warning Poison

Herbicides

- Formulations: Refine M:** Soluble granules; 33.35% thifensulfuron methyl, 16.65% tribenuron methyl (PCP# 28285); 480 g container. Emulsifiable concentrate; MCPA Ester IV 600; 2 x 9.1 L.
Broadside: Refine SG Toss-N-Go (PCP# 28286); 33.35% thifensulfuron methyl + 16.65% tribenuron methyl; 486 g. IPCO MCPA Ester 500 liquid (PCP# 20307); MCPA 500 g/L. Container size – each case contains 2 split jugs that hold 486 g Refine SG Toss-N-Go and 9.1 L of MCPA Ester.
- Registered Mixes:** Horizon + Score (95 mL/ac + 0.8% v/v).
Puma¹²⁰ Super (312 mL/ac or 156 mL/ac on green foxtail only). Axial (161 - 283 mL/ac). Assert.

Note: Do not use surfactant when tank mixing with grass herbicide unless specified on grass herbicide label.

Mixing directions: Use mixing procedure "b" on page 12.

- Crops:** Barley, oats, wheat (durum or spring).

- Weeds Controlled:** 12 g/ac Refine SG + 228 mL/ac MCPA Ester.

ball mustard	flixweed	narrow-leaved	tartary buckwheat (8.3)
chickweed (8.5)	green smartweed	hawk's-beard	volunteer canola (including
common groundsel	hemp-nettle (8.4)	redroot pigweed (8.4)	Clearfield biotypes) (8.6)
corn spurry (8.8)	kochia (7.7)	Russian thistle (7.9)	volunteer sunflower
cow cockle (8.7)	lady's-thumb	shepherd's-purse (8.2)	wild buckwheat (8.6)
dandelion	lamb's-quarters (8.6)	stinkweed (8.6)	wild mustard (8.6)

- Weeds Suppressed:** Canada thistle (7.1), cleavers (6.7), round-leaved mallow (6.4), scentless chamomile (6.9), sow thistle, stork's-bill (6.7), toadflax [less than 15 cm tall (7.1)].
- When Used: Crop stage:** Barley, oats, spring wheat (including durum) full 3 leaf to expanded shot blade.
Weed stage: Apply to young, actively growing weeds before the canopy closes. Weeds emerging after treatment may not be controlled. **Canada thistle, sow thistle:** Apply when the majority of the thistles have emerged and are actively growing. For best top growth control, apply when thistles are no larger than 15 cm tall, before bud stage and before crop canopy prevents thorough coverage of the thistles. A single application will effectively inhibit the ability of emerged thistles to compete with the crop. Later emerging thistle will not be controlled. **Chickweed:** Apply when the chickweed is small (1 - 6 leaf) and actively growing, but before crop canopy prevents thorough coverage of weeds. Chickweed emerging after application will not be controlled. **Cleavers:** 1 - 3 whorl stage. **Dandelion:** Fall or spring rosettes up to 15 cm diameter. **Round-leaved mallow:** Apply to actively growing round-leaved mallow in the 2 - 6 leaf stage (10 - 12 cm in height). Refine Extra will keep mallow stunted but may not reduce the overall populations. **Toadflax:** Apply when toadflax is no taller than 15 cm in height. A control program for this weed includes both frequent tillage and chemical application. **Wild buckwheat:** 1 - 5 leaf stage and actively growing.

7. How to Apply:

With: Ground equipment only.

Rate: Barley, oats, wheat (durum and spring). Refine SG 12 g/ac + 227 mL/ac MCPA Ester.

Surfactant: 2 L/1,000 L of spray solution.

Water volume: 22 L/ac (minimum).

Pressure: 275 kPa.

Nozzles: Flat fan type. Use 50 mesh or larger screens. Use only metal or nylon filters.

Refine M/Broadside (cont'd)

Sprayer cleanup:

To avoid subsequent injury to crops other than wheat, spring barley or oats, immediately after spraying and prior to spraying other crops, thoroughly remove all traces of Refine M herbicide from mixing and spray equipment using cleanout method A on page 16.

- 8. Application Tips:** Higher spray volumes are required for dense crop canopy and/or large weeds. Weeds should be less than 10 cm tall or across at application. Effectiveness of Refine M may be reduced if it remains in the tank for more than 24 hours.
- 9. How it Works:** Absorbed through foliage. Inhibits cell elongation. Stem elongation, leaf cupping, or curling.
- 10. Expected Results: Weeds:** Refine SG – Growth stops immediately. Discolouration of dying weeds may not be noticeable for 1 - 3 weeks after application depending on growing conditions and weed species.
Poor results may be expected if there is improper mixing, timing, coverage or when weeds are under drought stress.
 MCPA Ester – Weeds start to twist between 2 - 20 days after spraying, depending on weather conditions, formulation and weeds. Following the twisting and bending, plants will turn brown and then die. Only emerged weeds will be controlled.
Crop: MCPA Ester – Yellowing and thinning of the crop may be noticed if higher than recommended rates are used.
- 11. Effects of Rainfall:** Rainfall within 2 hours of application may lessen degree of weed control with Refine M.
- 12. Movement in Soil:** Refine SG – moves little in the soil and disappears from the soil quickly. MCPA Ester – Readily leached from soil. Longer residual in dry soil.
- 13. Cropping Restrictions:** Barley, oats, and wheat may be grazed or fed to livestock 7 days after application of Refine M/Broadside. Do not plant to any crop until 2 months after application. Do not exceed a total of 12 g of Refine SG per crop year.
Grazing restrictions: Do not graze treated crops or cut for hay within 7 days of application.
- 14. Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) (mg/kg) = >5,000.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Store in a cool, dry place.
- 17. Resistance Management:** See page 41 for information on resistance management.

Refine SG *(thifensulfuron-methyl + tribenuron-methyl)*

Group 2

Manufacturer: E.I. duPont Canada Co.



Caution Poison

- 1. Formulations: Refine SG:** 33.3% thifensulfuron methyl, 16.7% tribenuron methyl; soluble granules (PCP# 28285); 480 g container.
- 2. Registered Mixes:** Curtail M (600 mL/ac + surfactant); Lontrel (85 mL/ac) + surfactant; Lontrel + MCPA (83 mL/ac Lontrel + 336 mL/ac MCPA Ester 500) + surfactant; Lontrel + 2,4-D (83 mL/ac Lontrel + 336 mL/ac 2,4-D Amine 500 or 240 mL/ac 2,4-D Ester LV 700) + surfactant; MCPA (280 - 445 mL/ac Amine 500 or Ester 500 + surfactant); 2,4-D (340 - 445 mL/ac Amine 500 + surfactant; 280 - 365 mL/ac Ester 600 + surfactant; not for use on oats). Assert*, Assert* + MCPA Ester 500, Avenge*, Horizon 240 EC + Score surfactant (spring wheat including durum only) (see Horizon label for mixing instructions),

Safety information, see page 25

Refine SG (cont'd)

Puma¹²⁰ Super (312 mL/ac or 156 mL/ac on green foxtail only); Attain (121 mL/ac of fluroxypyr + 225 mL/ac 2,4-D Ester); Banvel II (44.5 mL/ac) (barley **not** underseeded to legumes and all spring wheat including durum). Axial: Axial + MCPA Ester 500. Everest 70 WDG (spring wheat – including durum): 18 g/ac (heavy infestations of oats and foxtail); 12 g/ac (light infestations) and 9 g/ac (green foxtail only).

* Do not use surfactant when tank mixing with grass herbicide unless specified on grass herbicide label.

Surfactants: Agral 90, Ag-Surf, Citowett Plus, Super Spreader. Use a surfactant when Refine SG is used alone or in a mixture with MCPA or 2,4-D.

Mixing directions: Using mixing procedure "b" on page 12.

3. Crops:

Barley, durum wheat, oats, spring wheat, winter wheat.

Seedling or established grasses for forage or seed production

creeping red fescue	meadow bromegrass	slender wheatgrass	tall fescue (seedling only)
crested wheatgrass	northern wheatgrass	smooth bromegrass	tall wheatgrass
intermediate wheatgrass	orchard grass	streambank wheatgrass	western wheatgrass
Kentucky bluegrass (established)	pubescent wheatgrass		

Underseeding: Do not apply to crops underseeded to legumes or grasses.

4. Weeds Controlled:

Refine SG 12 g/ac alone

ball mustard	green smartweed	redroot pigweed (8.4)	volunteer canola
chickweed (8.5)	hemp-nettle (8.4)	Russian thistle (7.9)	(excluding Clearfield) (8.6)
common groundsel	kochia (7.7)*	shepherd's-purse (8.2)	volunteer sunflower
corn spurry (8.8)	lady's-thumb	stinkweed (8.6)	wild buckwheat (8.6)
cow cockle (8.7)	lamb's-quarters (8.6)	tartary buckwheat (8.3)	wild mustard (8.6)
flixweed	narrow-leaved hawk's-beard		

* **Note:** Prairie-wide surveys of kochia fields have found approximately 90% of kochia populations that are Group 2 herbicide resistant. Without testing to confirm, assume the kochia in your field is resistant and will not be controlled by this product alone.

Refine SG 12 g/ac + MCPA or 2,4-D

ball mustard	giant ragweed*	prickly lettuce	tartary buckwheat
burdocks (seedling)	green smartweed	ragweed* (8.3)	tumble mustard
chickweed (8.8)	hare's-ear mustard	redroot pigweed* (8.7)	volunteer canola
cocklebur*	hemp-nettle (8.2)	Russian pigweed*	(including Clearfield)
common groundsel	Indian mustard	Russian thistle	volunteer sunflower
common plantain	kochia*	shepherd's-purse (7.9)	wild buckwheat (8.6)
corn spurry	lady's-thumb	stinkweed (8.6)	wild mustard
cow cockle	lamb's-quarters (8.7)	stork's-bill (2 - 6 leaf) (8.2)	wild radish
dandelion	narrow-leaved	(2,4-D Ester only)	wormseed mustard
false ragweed*	hawk's-beard		
flixweed			

Refine SG 12 g/ac + Banvel II 60 mL/ac

All weeds listed in Refine SG plus kochia (including Group 2 resistant biotypes) and dandelion (spring or fall rosettes < 15 cm in diameter).

* Use a minimum of 320 mL/ac of MCPA Amine 500.

5. Weeds Suppressed:

Canada thistle (7.1), cleavers (6.7), round-leaved mallow (6.4), scentless chamomile (6.9), sow thistle, stork's-bill (6.7), toadflax (less than 15 cm tall) (7.1).

6. When Used:

Crop stage: Refine SG alone: Barley, oats, spring wheat (including durum), winter wheat: 2 leaf - flag leaf stage.

Refine SG + Banvel II: Barley and wheat (excluding durum) 2 - 5 leaf stage.

Refine SG + MCPA: Barley, oats, wheat: Full 3 leaf to expanded shot blade.

Refine SG + 2,4-D: Barley and wheat: Full 3 leaf to expanded shot blade.

Refine SG (cont'd)

Weed stage: Apply to young, actively growing weeds before the canopy closes. Weeds emerging after treatment may not be controlled. Wild buckwheat: 1 - 5 leaf stage and actively growing. Apply Refine SG + Curtail M + surfactant to actively growing wild buckwheat in the cotyledon to 5 leaf stage. Cleavers: 1 - 3 whorl stage. Canada thistle, sow thistle: Apply when the majority of the thistles have emerged and are actively growing. For best top growth control, apply when thistles are no larger than 15 cm tall, before bud stage and before crop canopy prevents thorough coverage of the thistles. A single application will effectively inhibit the ability of emerged thistles to compete with the crop. Later emerging thistle will not be controlled. Apply Refine SG + Curtail M + surfactant post-emergent when the majority of the thistles have emerged and are actively growing. For best control, apply when thistles are no larger than 15 cm tall, before the bud stage and before crop canopy prevents thorough coverage of the thistles. Later emerging thistles will not be controlled. Chickweed: Apply when the chickweed is small (1 - 6 leaf) and actively growing, but before crop canopy prevents thorough coverage of weeds. Chickweed emerging after application will not be controlled. Dandelion: Refine SG + MCPA - fall or spring rosettes up to 15 cm diameter. Round-leaved mallow: Apply to actively growing round-leaved mallow in the 2 - 6 leaf stage (10 - 12 cm in height). Refine SG will keep mallow stunted but may not reduce the overall populations. Toadflax: Apply when toadflax is no taller than 15 cm in height. A control program for this weed includes both frequent tillage and chemical application.

7. How to Apply:

With: Ground and aerial equipment.

Rate: Barley, wheat (spring, winter, durum), oats: Refine SG 12 g/ac.

Surfactant: 2 L/1,000 L of spray solution.

Water volume: Ground: 22 L/ac (minimum). Air: 11 L/ac.

Pressure: 275 kPa.

Nozzles: Flat fan type. Use 50 mesh screens. Use only metal or nylon filters.

Sprayer cleanup:

To avoid subsequent injury to crops other than wheat, spring barley or oats, immediately after spraying and prior to spraying other crops, thoroughly remove all traces of Refine SG herbicide from mixing and spray equipment using cleanup method A on page 16.

- 8. Application Tips:** Higher spray volumes are required for dense crop canopy and/or large weeds. Weeds should be less than 10 cm tall or across at application. Effectiveness of Refine SG may be reduced if it remains in the tank for more than 24 hours. Use Assert tank mixes within 12 hours.

- 9. How it Works:** Absorbed through foliage. Inhibits cell elongation.

10. Expected Results:

Weeds: Growth stops immediately. Discolouration of dying weeds may not be noticeable for 1 - 3 weeks after application depending on growing conditions and weed species. **Poor results may be expected if** there is improper mixing, timing, coverage or when weeds are under drought stress.

- 11. Effects of Rainfall:** Rainfall within 1 hour of application may lessen degree of weed control with Refine SG.

- 12. Movement in Soil:** Refine SG moves little in the soil and disappears from the soil quickly.

- 13. Cropping Restrictions:** Do not plant to any crop until 2 months after application. Do not exceed a total of 12 g/ac per crop year for Refine SG.

Grazing restrictions: Barley, wheat and oats may be grazed or fed to livestock 7 days after application of Refine SG. Do not graze the treated crop or cut for hay within 7 days of application of these mixes.

- 14. Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = >5,000 mg/kg.

- 15. Precautions, First Aid:** Check label for first aid information.

- 16. Storage:** Store in a cool, dry place.

- 17. Resistance Management:** See page 41 for information on resistance management.

Reglone Desiccant (*diquat*)

Group 22

Manufacturer: Syngenta Crop Protection Canada Inc.



Caution Poison

1. **Formulations:** Liquid; 240 g/L diquat (PCP# 26396); 10 L jug, 115 L.

2. **Registered Mixes:** None.

Surfactant: Agral 90, Ag-Surf.

3. Crops:

adzuki beans	chick peas	kidney beans	potatoes	sunflowers (all)
alfalfa	dry peas	lentils	red beans	white beans
bird's-foot trefoil	field peas	mustard (condiment	red clover	white clover
canola*	flax	type only)	soybeans	

* Argentine canola varieties: should only be used to facilitate harvest of lodged crops. Losses can occur due to pod drop and pod shatter from handling and if unfavourable weather conditions occur.

4. **Weeds Controlled:** Non-selective for green vegetation, used for weed control and crop desiccation for harvest.

5. **Weeds Suppressed:** Not applicable.

6. When Used: For crop desiccation:

Alfalfa, clover (for seed), trefoil: Prior to seed harvest. To prevent seed pods from shattering and subsequent loss of seed, the interval between spraying and harvest should not exceed 7 days.

Note: Do not use Reglone on forage legumes that have been with a residual herbicide in the past 12 months.

Beans, soybeans: Application should coincide with 80 - 90% natural leaf defoliation.

Canola: When the crop is at the 75% seed turn (mainly brown) stage. Increased level of green seed resulting with earlier applications, see label for specific application information.

Chickpeas: Desi type: Apply when majority of plants are yellow, most pods are mature and seed colour has turned. **Kabuli type:** Apply when majority of plants are ripe and dry. Determine the youngest pod you will be able to harvest. Seeds from this pod should be detached and turning colour (green to white).

Flaxseed: When the crop is at the 75% boll turn stage (normal swathing time).

Lentils: When swathing would normally commence, lowermost pods are yellow-brown and rattle.

Mustard: When the crop is at the 75% seed turn (green to brown) stage.

Peas: When the crop has reached maturity.

Potato vines: At least 2 weeks before harvest. Do not apply Reglone during drought periods, especially when soil is so dry that plant leaves wilt during the day. After such conditions wait at least 3 days after soil has been moistened by rain or irrigation.

Sunflowers: When the seeds reach maturity (20 - 50% moisture in the seed and hull).

7. How to Apply:

With: Aircraft or ground equipment. Booms on ground equipment must be high enough to ensure proper coverage of foliage.

Reglone Desiccant (cont'd)**Rate:**

Reglone: Add Agral 90 at 1 L/1,000 L spray mixture.

Crop	Ground application		Aerial application	
	Reglone L/ac	Water volume L/ac	Reglone L/ac	Water volume L/ac
Alfalfa, bird's-foot trefoil, clover (for seed)	0.68 - 1.1	90 - 220	0.68 - 1.1	18
Beans, soybeans (normal crop)	0.68	90 - 220	0.68	18
Beans, soybeans (dense crop)	0.68	90 - 220	1	18
Canola, chickpeas*, flaxseed, lentils, mustard, peas, sunflowers (normal crop, no weeds)	0.68	90 - 220	0.68	18
Canola, flaxseed, lentils, mustard, peas, sunflowers (dense crop, weedy)	0.68	~	0.68	18
Potatoes (top growth fully mature, top growth light and weedy)	0.68	220 - 445	0.68	18
Potatoes (light stands, little weed growth)	0.68 - 1.0	220 - 445	0.68 - 1.0	18
Potatoes (heavy stands or weedy fields)	1.4	220 - 445	1.4	18

* Not registered for aerial application.

Note: Add Agral 90 or Ag-Surf at the rate of 1 L/1,000 L of spray solution

Water volume: Aircraft: 18 L/ac. Ground: 90 - 220 L/ac (potatoes: 220 - 445 L/ac). Higher volumes for best results.

Alfalfa, canola, clover, trefoil, beans, soybeans, flax, mustard, peas, sunflowers:
90 - 220 L/ac.

Pressure: 275 - 400 kPa.

Nozzles: Aircraft flat fan type or hollow cone type (D8, D10 or D12 disc with 46 or 56 swirl plate). For ground application, flat fan.

8. **Application Tips:** Muddy water will reduce effectiveness. Applications made on cloudy days or just prior to or during periods of darkness will increase effectiveness. Polish varieties may be straight combined. Immature weeds may require higher application rates to increase effectiveness.
9. **How it Works:** Reglone is a contact type herbicide; therefore, thorough spray coverage is essential. Absorbed by all leaf and stem surfaces, non-systemic. Interferes with photosynthesis.
Warning: During adverse weather (heavy rain, hail or strong winds), the resultant damage to crops may be enhanced.
10. **Expected Results:**
Weeds: Fast and virtually complete top kill of annual weeds. Yellowing starts within a few hours of application. Desiccation of the plant will continue rapidly till death.
Crops: Leaf kill will occur within a few days of application. Stem dry-down will take longer depending on the crop; however, harvesting should normally commence within 7 - 14 days. Crop losses can occur due to pod drop and pod shatter from handling and if unfavourable weather conditions occur.
11. **Effects of Rainfall:** No effect once the spray solution has dried.
12. **Movement in Soil:** Binds to the soil and becomes biologically unavailable. No residual effect.
13. **Cropping Restrictions:**
Grazing restrictions: Crop waste remaining after harvest (e.g. pea and lentil vines, alfalfa stems, etc.) may be used as a feed supplement for livestock. Prevent drift onto crops, ornamental plants, lawns, shelterbelts, grazing areas, wildlife cover, wetlands and other desirable growth.

Reglone Desiccant (cont'd)

14. **Toxicity:** High acute mammalian toxicity. Acute injective toxicity of 886 mg/kg. **Potential to cause eye damage, if eyes are constantly exposed.** May cause oral and nasal irritation shortly after use. Does not cause lung damage. May cause burns upon contact with skin and eyes. Intake can cause kidney failure and liver damage.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Heated storage is necessary. Store in original container, tightly closed in a safe place away from children.
17. **Resistance Management:** See page 41 for information on resistance management.

Remedy (triclopyr)

Group 4

Manufacturer: Dow AgroSciences Canada Inc.



Caution Poison

1. **Formulations: Remedy:** Emulsifiable concentrate; 480 g/L (PCP# 26420); 10 L jug.
2. **Registered Mixes:** None.
3. **Crops: Remedy:** Pasture, rangeland.
4. **Weeds Controlled:**

Brush

alder
aspen
balsam poplar*

birch
chokecherry*
cottonwood

dogwood
elderberry
maples*

pine*
poison oak
raspberry*

tamarack
wild rose
willow

* Hard to control.

Weeds

burdock
curled dock

dandelion
field bindweed

lamb's-quarters
ragweed

smartweed
smooth bedstraw

vetch
wild lettuce

5. **Weeds Suppressed:** None.
6. **When Used:**

Foliar applications: For best results, application of Remedy should be made when brush is actively growing. Applications can commence once leaves are fully expanded and continue until 10 days prior to the first signs of autumn colouration. Unsatisfactory results are likely if foliage has lost its normal colour and/or texture.

Basal bark applications: Any time (dormant or growing) the target zone of the stem and/or root collar can be clearly seen and treated. Stems must be dry when application is made.

7. **How to Apply:****A. Ground application recommended**

With: Boom, Radi-arc, OC nozzles, handgun or backpack.

Rate:

Brush: 1.6 - 3.2 L/ac.

Weeds: 0.4 - 1.6 L/ac.

Water volume: 80 L/ac or more.

Nozzles: Apply with a medium or coarse droplet nozzle that will ensure good uniform coverage of leaves.

8. **Application Tips:**

Foliar application: Weeds and brush should be actively growing. Best results occur when uniform

Safety information, see page 25

Remedy (cont'd)

coverage occurs. Higher application volumes (80 L/ac or more), depending on the application system, provide the desired uniformity of coverage. The key to successful application is even uniform application with no shadows or scattered, large splotch drops on target plants. Do not treat woody plants more than 2.5 m in height. For woody plants exceeding 2.5 metres, cut and spray regrowth or use basal bark treatment. Use higher rates for species listed as hard to control. Use higher rate for late summer application when plant growth rates are reduced. If lower rates are used on hard to control species, resprouting may occur and treatment may be necessary the following year. Do not contaminate water. Keep out of lakes, streams, ponds, irrigation ditches and domestic water supplies. Avoid drift or overspray of vegetable crops, grapes, fruits, flowers and other desirable broadleaf plants.

Streamline basal bark treatment: Use 20 or 30 L of Remedy in enough mineral oil diluent to make 100 L of spray mixture. Use on stems that are 8 cm in basal diameter. Apply sufficient spray to form a band 5 cm wide. If stems are 8 - 15 cm in diameter, treat both sides of the stem so that a 5 cm wide band is treated. Direct spray to a point on the stem 30 - 50 cm above ground level. Old rough bark may require more spray than smooth young bark. Apply any time, including winter months, except when snow or water prevent spraying at desired height above ground level. To control resprouting of cut stumps of woody species, mix 20 - 30 L of Remedy in enough mineral oil to make 100 L of spray mixture. Apply with a backpack sprayer using a flat fan or a solid cone nozzle. Thoroughly wet outer portion of the cut surface adjacent to the cambium and the sides of the stumps, including the root collar area, but not to the point of runoff. Apply at any time including winter months, except when snow or water prevents spraying to the ground line. Care must be given to ensure treatment of all cut stems in a clump.

9. **How it Works:** Interferes with cell division and elongation, causing leaf cupping, stem distortion and eventual death. Remedy is absorbed through leaves and stems of susceptible plants.
10. **Expected Results:** Within 1 or 2 weeks of treatment, leaves of treated vegetation display cupping and browning. Within the first season, smaller twigs and stems become brittle and die.
11. **Effects of Rainfall:** Rain within 2 hours of application may cause poor results to occur.
12. **Movement in Soil:** Triclopyr is relatively strongly bound to organic carbon and clay colloids, so movement with soil water is unlikely to occur.
13. **Cropping Restrictions:**

Grazing restrictions:**Grazing or harvesting green forage:**

1. Lactating dairy animals:
Up to 1.9 L/ac - Do not feed for 14 days following treatment.
1.9 - 3.2 L/ac - Do not feed for 60 days following treatment.
2. Other livestock:
Up to 1.9 L/ac - No restriction.
1.9 - 3.2 L/ac - Do not feed for 14 days following treatment.

Note: If less than 25% of grazed area is treated, there is no grazing restriction (**for other livestock only**).

Haying (harvesting of dried forage):

1. Lactating dairy animals:
Do not feed hay which has been harvested within 60 days of treatment.
2. Other livestock:
Up to 1.9 L/ac - Do not harvest hay for 7 days following treatment.
1.9 - 3.2 L/ac - Do not harvest hay for 14 days following treatment.

14. **Toxicity:** Moderate acute mammalian toxicity. Acute oral LD₅₀ (male rats) = technical triclopyr 729 mg/kg; Formulated product = 2,460 mg/kg.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Store in a cool, dry place above -2°C. If stored below -2°C, agitate before use.
17. **Resistance Management:** See page 41 for information on resistance management.

Restore (aminopyralid + 2,4-D amine)

Group 4

Manufacturer: Dow AgroSciences Canada Inc.



Warning Poison

Herbicides

- Formulations:** **Restore A:** 240 g/L aminopyralid (PCP# 28137); 3 L jug.
Restore B: 564 g/L 2,4-D Amine 600 (PCP# 28271); 2 x 7.65 L jugs.

- Registered Mixes:** None.

- Crops:** Permanent grass pasture and rangeland.

- Weeds Controlled:**

absinth wormwood*	Canada goldenrod	flixweed	prickly lettuce
annual sow thistle	Canada thistle*	goat's-beard	ragweeds
blue bur	cocklebur	gumweed	scentless chamomile
blue lettuce**	common plantain	hawkweed	spotted knapweed
bull thistle	common tansy	hoary cress	stinging nettle
burdock***	curled dock***	perennial sow thistle	sweet clover
buttercup	dandelion	peppergrass	western snowberry**

* Season-long control.

** Top growth control.

*** Less than 4 leaf.

- Weeds Suppressed:** None.

- When Used:** Apply when weeds are young and actively growing in the vegetative stage.

- How to Apply:**

With: Ground equipment or by air.

Rate: Aminopyralid: 0.2 L/ ac. 2, 4-D Amine 600 1L/ac.

Water volume: **Ground application:** 80 L/ac minimum. **Aerial application:** 20 L/ac minimum.

Nozzles: Use an approved drift control system that produces coarse droplets in a uniform pattern.

Pressure: Use the pressures that will give the lowest amount of drift while maintaining good pattern and coverage.

- Application Tips:** Apply in spring or early summer after weeds have fully emerged and when weeds are actively growing. Ensure that there is adequate coverage of target weeds. Drift of even small amounts of Restore into sensitive plants or areas where sensitive crops may be grown can cause injury. Do not apply under conditions prone to drift (i.e. high winds and temperature inversions).

- How it Works:** Restore herbicide interferes with cell division causing leaf cupping, stem distortion and eventually death of the plant. Restore is absorbed through the leaves and roots of the plant.

- Expected Results:** Perennial weeds show distorted stems and cupped leaves, which turn yellow and then brown. Usually, native grass increases in abundance as result of reduced competition. Poor results may be expected if weeds are not actively growing in late summer or as a result of environmental stress such as frost or drought.

- Effects of Rainfall:** Heavy rainfall immediately after application may wash the chemical off the foliage, resulting in reduced weed control. Do not apply if rainfall is forecast for the time of application.

- Movement in Soil:** Aminopyralid, one of the components in Restore, may move with water in very coarsely textured soils. The use of this product may result in contamination of groundwater particularly in areas where soils are permeable (e.g. sandy soils) and/or if the depth to the water table is shallow.

- Cropping Restrictions:** If legumes are essential in a pasture, do not use Restore. Do not break up treated pasture and plant to sensitive broadleaf crops for at least 3 years after application of Restore.

Restore (cont'd)

Grazing: Do not allow lactating dairy animals to graze treated areas within 7 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter. Do not harvest forage or cut hay within 30 days of application.

14. **Toxicity:** Moderate acute mammalian toxicity for both the aminopyralid and 2,4-D Amine.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Store in a cool, dry place. Do not freeze. If frozen, warm to room temperature and mix thoroughly before using.
17. **Resistance Management:** See page 41 for information on resistance management.

Reward *(diquat)*

Group 22

Manufacturer: Syngenta Crop Protection Canada Inc.



Caution Poison

1. **Formulations:** 240 g/L (PCP# 26271); 4 x 3.78 L case.
2. **Registered Mixes:** None.
3. **Crops:** For control of weeds in still or slow moving water of farm ditches, farm dugouts, farm ponds, lakes and canals.
4. **Weeds Controlled:** Canada waterweed, coontail, duckweed, pondweeds, water milfoil.
5. **Weeds Suppressed:** Algae: Cladophora, Pithophora and Spirogyra will be temporarily controlled.
6. **When Used:** Apply only after weeds are visible and in an active growth stage, which is normally sometime in late May through June as growth depends on water temperatures. Application must be made to actively growing weeds before they become so thick that they make application difficult. Application to dense growth of mature or fully established weeds will not give satisfactory control.
7. **How to Apply:**

For floating weeds, use surface application: Dilute one part Reward with at least four parts clean water and spray over water surface. Apply from the banks of small bodies of water.

For submerged weeds, inject below the water surface: A suction type of boat bailer is mounted on the cavitation plate of an outboard motor and the end of the inlet tube inserted into a solution containing one part Reward diluted with at least 10 parts of clean water (a backpack sprayer may also be used). Make lines of travel at regular intervals through the water (3 m or less apart) over the area to be treated until the whole area has received a uniform application.

Rate:

For areas less than 1.5 m (5 feet) deep: 7.4 L/ac.

For areas more than 1.5 m (5 feet) deep: 10 - 11.8 L/ac.

Calculating area to be treated: length (m) x width (m) ÷ 10,000 m² x 2.47 = acres.
8. **Application Tips:** Do not apply to muddy water and do not agitate water excessively during one or two days after treatment as the effectiveness of the chemical will be reduced. Use clean water for diluting the chemical. Do not use wetting agents or surfactants for water treatment. Repeat treatment may be necessary if weed growth reappears. Avoid application or drift onto crops or other desirable growth.
9. **How it Works:** Reward is a contact herbicide. Thorough coverage on the weeds is essential to ensure satisfactory control. Interferes with photosynthesis.
10. **Expected Results:** Control of susceptible weeds generally occurs within 1 - 2 weeks.
11. **Effects of Rainfall:** None.

Safety information, see page 25

- 12. Movement in Soil:** Is absorbed rapidly and becomes biologically inactive and unavailable upon contact with soil, mud or lake bottoms.
- 13. Cropping Restrictions:** Do not use treated water for at least 24 hours after application for swimming or animal consumption. For human consumption and irrigation do not use for at least 5 days after treatment. In water containing fish, do not treat more than 1/4 to 1/3 of the area at one time, otherwise the dying weeds over a large area will cause a serious loss of oxygen which may result in injury or kill the fish.
- 14. Toxicity:** Acute mammalian toxicity. Acute oral LD₅₀ = 886 mg/kg (rats). **Potential to cause eye damage, if eyes are constantly exposed.** May cause oral and nasal irritation shortly after use. May cause burns upon contact with skin and eyes. Intake can cause kidney failure and liver damage.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Store above 0°C. If frozen, warm to room temperature, agitate gently until reconstituted.
- 17. Resistance Management:** See page 41 for information on resistance management.

Roundup products are listed under Glyphosate.

Rustler (glyphosate + dicamba)

Group 9,4

Manufacturer: Monsanto Canada Inc.



Danger Corrosive

- 1. Formulations:** Water soluble liquid; 194 g/L glyphosate + 46 g/L dicamba isopropylamine salt (PCP# 27200); 10 L, 115 L, 450 L, 750 L containers.
- 2. Registered Mixes:** 2,4-D. Tank mix registered for summerfallow or prior to seeding/after seeding prior to emergence of wheat, barley, rye.
- 3. Crops:** Chemical fallow. Preseeding: Barley, field corn (not sweet corn), oats, rye, wheat.
- 4. Weeds Controlled:**

cow cockle	lady's-thumb	smartweed	wild buckwheat
downy brome	lamb's-quarters	stinkweed	wild mustard
flixweed	Persian dandel	volunteer cereals	wild oats
green foxtail	redroot pigweed	volunteer canola (excluding	
kochia	Russian thistle	glyphosate tolerant canola)*	

* Volunteer glyphosate tolerant canola can be controlled with 2,4-D up to the 6 leaf stage.

- 5. Weeds Suppressed:** Foxtail barley.

6. When Used:

Annual grassy weeds: Any time between emergence and heading.

Annual broadleaf weeds: Up to 15 cm tall. Wild buckwheat 1 - 4 leaf stage.

Foxtail barley: Before initiation of seed head or browning of lower leaves.

7. How to Apply:

With: Ground equipment only. Avoid galvanized steel or unlined steel (except stainless steel) spray tanks.

Rate:

Weeds	Rustler L/ac
Annual broadleaf	1.0
Annual grassy weeds	1.0
Foxtail barley	1.3

Rustler (cont'd)

Water volume: 20 - 40 L/ac **clean** water. Lower water volume may improve results, particularly with extremely hard water (greater than 700 ppm calcium + magnesium).

Pressure: 275 kPa.

Nozzles: Flat fan nozzles.

8. **Application Tips:** For best control of winter annual weeds such as flixweed, 2,4-D should be applied to emerged, actively growing weeds in the fall previous to the fallow season or in early spring in the fallow season when winter annual weeds are less than 10 cm tall. Under certain stress conditions such as drought, cool temperatures or where extremely hard water (>700 ppm Ca + Mg) has been used, weed control may be reduced with this product. However, lower water volume (20 L/ac) may improve results. Clean the entire sprayer after application of this product. Failure to clean the sprayer thoroughly may result in injury to desirable crops that are subsequently sprayed. First, add clean water to the tank and thoroughly rinse the entire spray system. Secondly, fill the tank with water and ammonia (1 L household ammonia/100 L water). Pump enough solution through the system to fill all parts completely. Then fill tank, close and leave for 24 hours before draining and rinsing with water.
9. **How it Works:** A post-emergent herbicide. Moves from foliage into roots and kills entire plant.
10. **Expected Results:** Visual effects will usually appear within 5 - 7 days. Wilting or yellowing of weeds advances to complete browning of above ground growth and deterioration of affected underground parts.
11. **Effects of Rainfall:** Heavy rainfall within 2 hours may wash the chemical off the foliage and repeat treatment may be required. Rainfall within 6 hours may reduce effectiveness.
12. **Movement in Soil:** The amount of leaching is very low.
13. **Cropping Restrictions:**
Succeeding crops: Certain broadleaf crops such as lentils, peas, canola and flax can be injured by a preseeded application of Rustler and should not be planted in a field that has been treated with this product.
Grazing restrictions: Do not graze or harvest treated areas until plants have turned brown and started to deteriorate.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) = glyphosate 4,300 mg/kg; Dicamba = 2,600 mg/kg. Eye irritant. May cause allergic skin reaction. Non-toxic to bees and birds. Can be absorbed through the skin and causes burns to skin and eyes.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Store above 5°C to keep product in solution. If crystals form, place in a warm room (20°C). Roll or shake solution until crystals have redissolved.
17. **Resistance Management:** See page 41 for information on resistance management.

Select/Centurion/Arrow 240 EC/ Shadow RTM (clethodim)

Group 1

Manufacturer: Arysta LifeScience Canada Inc./Bayer CropScience Inc./MANA Canada/Viterra



Caution Poison

1. **Formulations:** Emulsifiable concentrate; 240 g/L clethodim (PCP# 22625); 3 L Select + 9 L Amigo (PCP# 22644), 3 L Centurion (PCP# 27598) + 9 L Amigo (PCP# 22644), 3 L Arrow (PCP# 28224) + 9 L X-Act (PCP# 28225), 3 L Shadow RTM (PCP# 29277) + 9 L Amigo (PCP# 22644).

Safety information, see page 25

- 2. Registered Mixes:** Addition of the adjuvant Amigo(X-Act with Arrow) at 0.5% v/v is mandatory. Buctril M (400 mL/ac) in flax including low linolenic varieties or Curtail M (600 - 800 mL/ac) in flax, excluding low linolenic varieties. Amigo (X-Act with Arrow) must be used in tank mix of Select/Centurion/Shadow RTM and Buctril M(Badge for Arrow) or Curtail M. Follow recommendations on Buctril M, Lontrel (flax, canola), MCPA Ester (flax), Muster (canola) labels and Pursuit (field peas, 85 mL/ac or 42.5 mL/ac), Muster (8 or 12 g/ac), Liberty (Liberty Link Canola).

3. Crops:

black dry beans*	fenugreek**	linola (including low linolenic flax)	potatoes
brown mustard	field peas	navy dry beans*	red dry beans*
canola	flax	oriental mustard***	seeding alfalfa
coriander**	great northern dry beans*	pink dry beans*	soybeans
Desi chickpea*	Kabuli chickpea*	pinto dry beans*	sunflowers
dry onions	lentils		yellow mustard

All dry beans of the *Phaseolus vulgaris* group

* Application rate of 50 - 76 mL/ac on dry beans and chickpeas.

** For coriander and fenugreek use only Select or Centurion.

*** Including both condiment and oilseed types with Select/Centurion.

4. Weeds Controlled:

barnyard grass	Persian dandel	volunteer barley	volunteer wheat
fall panicum	proso millet	volunteer canary grass	wild oat
green foxtail	quackgrass	volunteer corn	witch grass
large crabgrass	smooth crabgrass	volunteer oat	yellow foxtail

5. Weeds Suppressed: Quackgrass.

6. When Used:

Crop stage: Apply at any growth stage of crops listed above. Chickpeas: Before crop reaches the 9th node stage (18 cm height maximum).

When tank mixing Select/Centurion/Arrow(X-Act)/Shadow plus Amigo with Buctril M for use in flax, do not spray in hot humid weather when daytime temperatures are over 25 - 29°C.

Weed stage: Apply when the annual grasses and the volunteer cereals are in the 2 - 6 leaf stage. Apply Select/Centurion/Arrow/Shadow when quackgrass is in the 2 - 5 leaf stage. Most effective when application is made at the 3 - 5 leaf stage, and the canopy is uniform and actively growing.

7. How to Apply:

With: Ground equipment.

Rate:

Grass species	Leaf stage	Rate (mL/ac)	Rate of Amigo/X-Factor
Green foxtail, volunteer cereals, wild oats, yellow foxtail	2 - 4	50	0.5% v/v
Barnyard grass, fall panicum, proso millet, volunteer canary grass, volunteer corn, witch grass	2 - 6	50	0.5% v/v
Barnyard grass, crabgrass, fall panicum, green foxtail, Persian dandel, proso millet, quackgrass suppression, volunteer canary grass, volunteer cereals, wild oats, witch grass, yellow foxtail	2 - 6	76	0.5% v/v
Quackgrass control	2 - 6	152	1.0% v/v

Water volume: 20 L/ac minimum - 80 L/ac maximum.

Pressure: 240 - 275 kPa minimum.

Nozzles: Flat fan recommended.

Select/Centurion/Arrow 240 EC/Shadow RTM (cont'd)**Mixing instructions:****Select/Centurion/Arrow/Shadow and Liberty –**

1. Thoroughly clean the sprayer by flushing the system with water containing detergent.
2. Fill clean spray tank half full with clean water. Start agitation system.
3. Add the required amount of Amigo or X-Act adjuvant to the tank. Continue to agitate until thoroughly mixed.
4. **Stop** agitation. Add the correct amount of Liberty to the spray tank. Start agitation system.
5. Add the correct amount of Select/Centurion/Arrow/Shadow along with the remaining amount of water necessary to fill the spray tank.
6. Continue to agitate or run the by-pass system and spray out immediately.
7. After any break in the spraying operation, agitate thoroughly before spraying again. Check inside the tank to ensure that sprayer agitation is sufficient to remix the spray materials. Do not allow the mixture to sit overnight.
8. If an oil film starts to build-up in the tank, drain it and clean tank with strong detergent solution.
9. Immediately after use, thoroughly clean the sprayer by flushing the system with clean water containing detergent.

For all other tank mixes, refer to instructions on Select/Centurion/Arrow/Shadow label.

8. **Application Tips:** The use of 80° stainless steel flat fan nozzles tilted 45° forward is recommended for optimum spray coverage. Use high water volumes on dense crop canopies for better penetration to weeds. Best results will occur if applications are made to weeds not stressed by lack of moisture, excessive moisture, low temperature and/or very low relative humidity. Select/Centurion/Arrow/Shadow at 50 mL/ac should only be applied under the following conditions: good crop stand, early application (prior to tillering), light to moderate weed infestation, adequate moisture and fertility, absence of stress, good growing conditions. Do not tank mix at lower rate with other pesticides. Do not apply the lower 50 mL/ac rate to volunteer winter cereals or when tank mixing with other pesticides.
9. **How it Works:** Select/Centurion/Arrow/Shadow is a systemic herbicide that is translocated from the treated foliage to the growing points of leaves, shoots and roots.
10. **Expected Results:**

Weeds: Leaf foliage will first change from green to yellowish, then purplish and finally a brown colour. The time required for complete control is 7 - 21 days following treatment, depending on growing conditions and crop competition.
11. **Effects of Rainfall:** Rainfall within one hour of application may reduce the effectiveness of the spray.
12. **Movement in Soil:** At recommended rates, very little movement occurs.
13. **Cropping Restrictions:**

Grazing restrictions: Do not graze or cut treated crops for forage until 60 days after application of Select/Centurion/Arrow/Shadow to annual crops and 30 days after application to seedling alfalfa.

Preharvest interval: Canola (60), chickpeas (60), dry beans (60), dry onions (45), fenugreek (30), field peas (75), flax (60), lentils (60), mustard (60), potatoes (60), soybeans (75), sunflowers (72).
14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = 3,610 mg/kg. Slightly toxic to rainbow trout.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Does not require heated storage.
17. **Resistance Management:** See page 41 for information on resistance management.

Sencor (metribuzin)

Group 5

Manufacturer: Bayer CropScience Inc.

- 1. Formulations:** **Sencor 480 F:** Flowable; 480 g/L (PCP# 26280); 4 x 5 L pack, 2 x 10 L pack. **Sencor 75 DF:** Water dispersible granular; 750 g/kg (PCP# 25840); 4 x 5 kg, 4 x 2.5 kg pack. **Sencor 75:** Water dispersible granular in water soluble packets (solupak) (PCP# 20968); 5 x 0.5 kg bags, 4 x 2.5 kg per case.
- 2. Registered Mixes:** Banvel (barley, wheat); Target (barley, wheat); MCPA Amine 500 (barley, wheat); Eptam (potatoes); 2,4-D Amine (barley and wheat); Treflan 545 EC (fababeans, field peas); MCPA Na-salt (field peas), Eptam (potatoes).

Mixing instructions: Shake container thoroughly before adding to spray tank. Mix Sencor in the tank before adding Edge or Treflan. Continually agitate until all the mixture is sprayed. Do not allow the sprayer to stand without agitation. When tank mixing with other products, add Sencor first then the tank mix partner.

Mixing restrictions: Do not tank mix with any other pesticide, wetting agent or surfactant.

3. Crops:

alfalfa (established)	fababeans (8.6)*	lupin	spring wheat (8.5)
asparagus	field peas (8.5)	potatoes (8.6)**	tomatoes (processing)
barley (8.9)	lentils (8.4)***	processing peas (7.9)	winter wheat

Underseeding: Do not underseed.

* Sencor + Treflan or Edge, **not** Sencor alone.

** Not on red skinned varieties.

*** In lentils, Sencor may only provide weed suppression rather than control.

4. Weeds Controlled: Sencor alone, post-emergent

Chickpea, lentils, field peas, processing peas

ball mustard (8.0)	green smartweed (8.5)	lamb's-quarters (8.4)	volunteer canola (non-triazine tolerant) (8.8)
chickweed (8.1)	hemp-nettle (8.4)	stinkweed (8.2)	wild mustard
corn spurry (7.1)	lady's-thumb	tartary buckwheat (5.3)	

Barley, spring wheat

annual smartweeds (8.5)	hemp-nettle (8.4)	night-flowering catchfly (sticky cockle)	stinkweed (8.2)
ball mustard	henbit (8.0)*	redroot pigweed (7.1)	tartary buckwheat (5.3)
chickweed (8.1)	lady's-thumb	Russian thistle (7.2)*	volunteer canola (8.8)
common groundsel	lamb's-quarters (8.4)		wild mustard (8.0)
corn spurry (7.1)			wormseed mustard (8.0)

Winter wheat**

downy brome	flixweed	shepherd's-purse	stinkweed (8.2)
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* Apply Sencor at 225 mL/ac (150 g/ac) for control of these weeds.

** Apply Sencor in October or November post-emergent after secondary root development 345 mL/ac to 453 mL/ac (227 g/ac - 304 g/ac).

Potatoes

ball mustard	hemp-nettle (8.4)	redroot pigweed (7.1)	tartary buckwheat (5.3)
chickweed (8.1)	lady's-thumb	shepherd's-purse	volunteer canola (8.8)
corn spurry (7.1)	lamb's-quarters (8.4)	stinkweed (8.2)	wild mustard (8.0)
green smartweed (8.5)			

Sencor + Treflan preplant

annual bluegrass	green smartweed	Persian dandelion	stinkweed
barnyard grass	hemp-nettle	purslane	volunteer rapeseed
bromegrass	knotweed	redroot pigweed	wild buckwheat
chickweed	lady's-thumb	Russian thistle	wild mustard
cow cockle	lamb's-quarters	shepherd's-purse	wild oats

Sencor (cont'd)

5. Weeds Suppressed: Banvel: Canada thistle (6.6) and sow thistle; MCPA; or 2,4-D mixes: Barley and wheat. Sencor + Edge: Volunteer barley, Russian thistle in fababean or field peas.

6. When Used:

Alfalfa (only irrigated): Sencor: In fall to dormant established stands. Injury may occur if Sencor is applied earlier than 18 months after seeding.

Barley, wheat: Do not use if soil has less than 3% organic matter. Sencor: 2 - 5 leaf. Banvel mix: barley, 2 - 3 leaf; wheat, 2 - 4 leaf. MCPA Amine mix: 3 - 5 leaf. Target mix: barley, 2 - 3 leaf; wheat, 2 - 5 leaf. 2,4-D Amine mix: 3 - 5 leaf.

Chickpea: Apply only up to the 3rd node above ground stage. Application past this growth stage may result in damage to the crop.

Fababeans: Treflan or Edge mix: pre-plant incorporated spring or fall. Do not use on muck soils.

Field peas: Treflan or Edge mix: pre-plant incorporated, spring or fall. Do not use on soils with less than 4% organic matter in fall or 5% in spring.

Lentils: Treflan mix: pre-plant incorporated, fall only. Do not use on soils with less than 4% organic matter.

Lentils, peas (post-emergent): Do not use if soil has less than 4% organic matter. Apply before vines are 15 cm long or before the 6th node stage and after weeds have emerged, but are less than 5 cm in height or diameter. In peas and lentils, use a single post-emergence application or a post-emergence split application. Under certain field or weather conditions, a split application of Sencor may provide better weed control than a single application. The first application should be made at the cotyledon, 2 leaf stage, of the weeds. The second application should be made when a second flush of weeds have emerged or if weeds that were more advanced at the time of the first application have started to regrow. In field peas only, tank mix with MCPA Na-salt at normal post-emergence application timing.

Potatoes: Sencor: post-emergent; before weeds are 4 cm tall. Eptam mix: pre-plant incorporated. Do not use on muck soils. Eptam mix: pre-emerge through sprinkler irrigation system.

Winter wheat (Norstar only): Apply in late fall after winter wheat has commenced tillering and initiated the development of secondary roots. Do not apply to irrigated wheat.

Note: Fall application of Sencor + Treflan or Edge is not recommended where soil drifting is a problem.

7. How to Apply:

Lentils, peas: Do not apply within 3 days after periods of cool, wet or cloudy weather as crop injury may occur. Plant lentils and peas at least 5 cm below the soil surface.

With: Ground equipment. Sencor can be affected by dusty conditions, particularly from wheel tracks; therefore, when these conditions are present, spray early in the day when dew will reduce dust. Slower sprayer speed will lower dust levels.

Rate:

Barley, Wheat		Klondike, Leduc, Johnston, AC Lacombe, TR128, Manley barley	
Sencor 500 F (75 DF)	Barley mL/ac (g/ac) + mL/ac	mL/ac (g/ac) + mL/ac	Spring wheat mL/ac (g/ac) + mL/ac
Alone	110 - 225 (80 - 150)	110 - 170 (80 - 110)	110 - 170 (80 - 110)
+ 2,4-D Amine	110 - 225 (80 - 150) + 345 - 445	Not recommended	110 - 170 (80 - 110) + 345 - 445
+ Banvel 480	110 - 170 (80 - 110) + 93	Not recommended	110 - 170 (80 - 110) + 93
+ MCPA Amine	110 - 225 (80 - 150) + 345 - 445	110 (80) + 345 - 445	110 - 170 (80 - 110) + 345 - 445
+ Target	110 - 170 (80 - 110) + 405 - 605	Not recommended	110 - 170 (80 - 110) + 405 - 605

Sencor (cont'd)

Crop	Sencor 500 F (mL/ac)	Sencor 75 DF (g/ac)	Tank mixes
Alfalfa (only irrigated)	910	610	No mixes
Chickpea (post-emergent)	170	110	No mixes
Lentils (post-emergent)	170	110	No mixes
(post-emergent, split application)	85 - 110 + 85 - 110	55 - 75 + 55 - 75	No mixes
Peas (pre-plant)	170 - 225	110 - 150	See below
(post-emergent)**	113	77	MCPA Na-salt, 190 mL/ac
(post-emergent, one application)	170 - 225	110 - 150	No mixes
(post-emergent, split application)	85 - 110 + 85 - 110	55 - 75 + 55 - 75	No mixes
Potatoes (pre-plant)*	225 - 345	150 - 225	Eptam 8-E, 1.70 - 2.2 L/ac
(pre-emergent irrigation)	225 - 450		Eptam 8-E, 1.70 - 2.2 L/ac
(post-emergent)*	225	150	Sencor alone
Winter wheat	345 - 500	225 - 300	Sencor alone

* Not on red skinned or any early maturing varieties.

** Refer to Pea Pack.

Fababean – Spring, Pre-plant Application

Sencor 500 F (75 DF)	Sandy soils – organic matter		Loam to clay soils – organic matter	
	2 - 3%	3 - 6%	6 - 10%	10 - 15%
Alone	170 mL/ac (110 g/ac)	225 mL/ac (150 g/ac)	225 - 345 mL/ac (150 - 225 g/ac)	345 mL/ac (225 g/ac)
+ Edge DC	+ 560 g/ac	+ 560 g/ac	+ 770 g/ac	+ 770 g/ac
+ Treflan 545 EC	+ 610 mL/ac	+ 610 mL/ac	+ 810 - 1,050 mL/ac	+ 810 - 1,050 mL/ac

Fababean – Fall, Pre-plant Application

Alone	225 mL/ac (150 g/ac)	285 mL/ac (190 g/ac)	285 - 345 mL/ac (190 - 225 g/ac)	345 mL/ac (225 g/ac)
+ Edge DC	+ 770 g/ac	+ 770 g/ac	+ 930 g/ac	+ 930 g/ac
+ Treflan 545 EC	+ 810 mL/ac	+ 810 mL/ac	+ 1,050 - 1,300 mL/ac	+ 1,050 - 1,300 mL/ac

Field peas – Spring, Pre-plant Application

Sencor 500 F (75 DF)	Sandy soils – organic matter		Loam to clay soils – organic matter	
	4 - 6%		6 - 10%	10 - 15%
Alone	225 mL/ac (150 g/ac)		225 - 285 mL/ac (150 - 190 g/ac)	285 mL/ac (190 - 225 g/ac)
+ Edge DC	+ 560 g/ac		+ 770 g/ac	+ 770 g/ac
+ Treflan 545 EC	+ 610 mL/ac		+ 810 - 1,050 mL/ac	+ 810 - 1,050 mL/ac

Field peas – Fall, Pre-plant Application

Alone	285 mL/ac (190 g/ac)		285 - 345 mL/ac (190 - 225 g/ac)	345 mL/ac (225 g/ac)
+ Edge DC	+ 770 g/ac		+ 930 g/ac	+ 930 g/ac
+ Treflan 545 EC	+ 810 mL/ac		+ 1,050 - 1,300 mL/ac	+ 1,050 - 1,300 mL/ac

Sencor (cont'd)**Lentils – Fall, Pre-plant Incorporated**

	Sandy soils – organic matter	Loam to clay soils – organic matter
Sencor 500 F (75 DF)	4 - 6%	6 - 15%
Alone	285 mL/ac (190 g/ac)	285 - 345 mL/ac (190 - 255 g/ac)
+ Treflan 545 EC	+ 810 mL/ac	+ 1,050 - 1,215 mL/ac

Water volume:

Barley, spring wheat, winter wheat, soybean, fababean: 40 L/ac.

Chickpea, lentils, peas: 70 L/ac.

Potatoes, asparagus: 40 - 120 L/ac.

Higher rates of water increase crop tolerance.

Pressure: 200 - 275 kPa.

Nozzles: Tilt nozzles 45° forward for better spray penetration in post-emergent applications.

Screens: Use 50 mesh or larger nozzle screens or metal filters. Do not use felt filters.

Incorporation:

Sencor + Eptam: On potatoes, see *Eptam*.

Sencor + Treflan: On fababeans and field peas: Apply and incorporate in the same operation if possible. Must be incorporated within 24 hours. Work twice in different directions. Use a tandem disc, discer or vibrashank type cultivator to cut 8 - 10 cm deep. Operate disc implements at 7 - 10 km/h; cultivators at 10 - 13 km/h.

With irrigation:

Sencor + Eptam: Potatoes: pre-emergence in sprinkler irrigation. Apply specified dosage in 3 - 8 mm of water per acre on a continuous injection in centre pivot systems, or in the last 15 - 30 minutes of set in permanent solid set sprinkler system of self-propelled wheel move systems. On sandy soil, apply in 3 - 5 mm of water and use the lower rate of Sencor and Eptam. Apply pre-emergence to crop and weeds. Use the higher rate for control of grassy weeds or when broadleaf weeds are dense.

- 8. Application Tips:** Allow 4 - 5 days between application of Sencor and post-emergent wild oat herbicides. Allow 4 - 5 days after frost for crop to recover before applying Sencor. Weed control may be reduced if Sencor is applied later than the 5 leaf stage of crop. Crop may be sprayed when wet with dew. Crop must be planted at least 5 cm below soil surface.

Sencor + Treflan: Cultivate to destroy existing weeds before application. On stubble fields, chop and thoroughly mix crop residues into soil to a depth of 10 - 15 cm. Disc type implements provide the best results. To avoid concentrating wild oat seeds below the treated layer and causing soil erosion, do not plow (moldboard) land prior to application. On variable soils with light, sandy areas, some injury may occur on the sandy areas if the rate used is for loam-clay soils. On soils with 10% organic matter and higher, broadleaf weed control may not be adequate. Do not apply to wet soils or soils subjected to periods of flooding. Do not incorporate with a field cultivator when the soil is crusted, lumpy or too wet for good mixing action.

Sencor post-emergence: For optimum weed control, it is important to apply Sencor post-emergent when weeds have just emerged and are very small. Crop tolerance is not affected by early application.

- 9. How it Works:** A systemic herbicide absorbed by leaves and roots and translocated to new growth. Inhibits photosynthesis and the weed turns brown and dies.
- 10. Expected Results:**

Broadleaf weeds: Initial yellowing 5 - 7 days after application; weeds turn brown and die within 14 - 16 days. Active in soil for a short period and can control new shallow-rooted germinants, like chickweed.

Crops: In extremely hot weather or when frost occurs within 1 - 2 days of application, crop will show some yellowing and slight reduction in height. Discolouration disappears in 7 - 10 days. On Klondike, Johnston, AC Lacombe and Leduc barley varieties, temporary lightening in colour and reduction in height may occur.

Sencor (cont'd)

Lentils and peas provide little competition against weed growth due to their low growth habit. Under heavy weed infestations or lush growth, control may be poor.

Field peas and lentils: Stress such as disease, cold, deep planting, excessive moisture, high salts or drought may weaken seedlings and increase the possibility of damage. Temporary lightening on the margins of cotyledons and a slight delay in development may occur. Ensure 70 L/ac water volume is used to reduce crop injury.

11. **Effects of Rainfall:** Rainfall within 6 hours after application may reduce weed control.
12. **Movement in Soil:** Little leaching occurs in soils with high organic matter.
13. **Cropping Restrictions: Grazing restrictions:** Do not graze or feed treated crop to livestock within 30 days of application (lentils, peas: 70 days).

Application to harvest interval (days): Grain (60); potatoes (60); lentils, peas (70).

Succeeding crops: 24 months are required for crops other than potatoes if 910 mL/ac (610 g/ac) is applied on irrigated alfalfa. Canola, celery, cole crops, cucurbits, lettuce, onions, peppers, spinach, sugar beets, sunflowers, table beets and turnips may be injured if planted in soil treated with Sencor during the year of application and the following crop year. Fall seeded or cover crops such as wheat, oats, and rye may be injured when seeded in the same season as the application of Sencor. For pre-plant applications of Sencor + Treflan or Edge, oats, sugar beets, creeping red fescue and small-seeded grasses (e.g. timothy, canary seed) should not be planted the following crop year as a precaution.

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = 1,100 - 2,300 mg/kg. Slightly toxic to fish and birds.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** No damage by freezing but avoid large temperature fluctuations. Store in a cool, dry place.
Note: A similar product is Lexone.
17. **Resistance Management:** See page 41 for information on resistance management.

Signal D (clodinafop propargyl + bromoxynil + 2,4-D)

Group 1,6,4

Manufacturers: Nufarm Agriculture Inc.

1. **Formulations: Signal Herbicide:** 240 g/L clodinafop-propargyl (PCP# 29172); 1.84 L, 2 x 18.4 L.
Approve: 225 g/L bromoxynil and 225 g/L 2,4-D ester (PCP# 28123); 10L, 2 x 100L.
Signal Adjuvant: (PCP# 29173) 6.4 L, 2 x 64 L.
2. **Registered Mixes:** None.
3. **Crops:** Durum wheat and spring wheat.
4. **Weeds Controlled:**

American nightshade
ball mustard
barnyard grass
bluebur
cocklebur
common buckwheat
common groundsel
common ragweed

flixweed
green foxtail
green smartweed
kochia
lady's-thumb
lamb's-quarters
night-flowering catchfly
pale smartweed

Persian dandelion
redroot pigweed
Russian thistle
shepherd's-purse
stinkweed
tartary buckwheat
triazine resistant pigweed
volunteer canola

volunteer oats
volunteer sunflower
wild buckwheat
wild mustard
wild oats
volunteer canaryseed
yellow foxtail

Signal D (cont'd)

5. Weeds Suppressed: None.

6. When Used: Crop stage: Spring and durum wheat: 4 leaf to early flag leaf.

Weed stage: Barnyard grass and Persian dandel: 1-5 leaf stage (prior to tillering); green and yellow foxtail: 1-5 leaf stage (prior to emergence of third tiller); volunteer oats: 3-6 leaf (max 3 tillers), wild oats and volunteer canaryseed: 1-6 leaf (max 3 tillers).

Broadleaf weeds: All weeds: up to the 4-leaf stage; buckwheats, groundsel, lamb's-quarters, stinkweed, wild mustard: up to the 8-leaf stage. Russian thistle, kochia control: before plants are 5 cm high.

7. How to Apply: With: Ground equipment. Do not apply by air.

Rate: Signal Herbicide: 93-117 mL/ac; Approve: 0.5 L/ac; Signal Adjuvant: 0.5% v/v (or 1 L/200 L of water).

Water volume: Minimum of 40 L/ac.

Nozzles: Flat fan recommended, tilted 45° forward for better penetration. 50-mesh screens and filters.

Pressure: 275 kPa.

Mixing instructions: Use mixing instructions "c" on page 12.

Sprayer cleanup: Use cleanup method B on page 16.

8. Application Tips: For optimum results, apply to actively growing weeds. An early application will maximize crop yields by reducing weed competition. Do not apply to crop that is stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result. Application before the 4 leaf stage may injure the crop.

9. How it Works: Thorough coverage of the plants is essential for consistent control. Signal D is absorbed by the leaves and is rapidly translocated to the growing points of leaves and stems. Approve contains two components, bromoxynil and 2,4-D. Bromoxynil is a contact type herbicide which inhibits photosynthesis and plant respiration. 2,4-D is a hormone type herbicide which causes abnormal growth, affects respiration, food reserves and cell division in broadleaf plants. Absorbed primarily by leaves and stems and translocated to the growing tips and roots.

10. Expected Results: Small burn spots on the leaf can appear within hours. Death takes up to 2 weeks.

Grassy weeds: Depending on species, growing conditions and crop competition, leaves and growing points turn yellow within one to three weeks after application. Further colour changes and loss of vigour will be observed, followed by a browning and complete control 3-5 weeks after application.

11. Effects of Rainfall: Rainfall within 2 hours may reduce weed control.

12. Movement in Soil: Leaching does not pose a problem.

13. Cropping Restrictions: Do not treat if underseeded with forages.

Grazing restrictions: Do not graze or harvest for green feed until 30 days after treatment. Withdraw meat animals 3 days before slaughter.

Other restrictions: Pre-harvest interval is 60 days.

Succeeding Crops: No restrictions.

14. Toxicity: Approve: Moderate acute mammalian toxicity. Intake of a large dose may cause convulsions, sudden collapse and coma. Can be absorbed through the skin. Very toxic to fish. Signal D: Acute Oral LD₅₀ (rats) = 2,276 mg/kg; Acute dermal (rats) = 4,000 mg/kg.

15. Precautions, First Aid: Check label for first aid information.

16. Storage: Store the product in closed, original container in well ventilated room.

17. Resistance Management: See page 41 for information on resistance management.

Signal M (clodinafop propargyl + bromoxynil + MCPA Ester)

Group 1,6,4

Manufacturers: Nufarm Agriculture Inc.

1. Formulations:

- Signal 240 EC: clodinafop-propargyl 240 g/L emulsifiable concentrate (PCP# 24067); 1 x 1.84 L.
- Mextrol 450: bromoxynil 225 g/L + MCPA 225 g/L (PCP# 26999); 10 L.
- Signal Adjuvant (PCP# 29173): 1 x 6.4 L.

2. Registered Mixes: None.

3. Crops: Durum wheat and spring wheat.

4. Weeds Controlled:

Wild oats: 1 - 6 leaf prior to emergence of 4th tiller.

Green foxtail: 1 - 5 leaf prior to emergence of 3rd tiller.

Barnyard grass, green foxtail, volunteer canary seed, volunteer tame oats, yellow foxtail.

Seedlings up to 4 leaf stage

American nightshade	flixweed	pale smartweed	shepherd's-purse
ball mustard	green smartweed	redroot pigweed	velvetleaf****
bluebur	kochia**	Russian thistle**	volunteer canola
cocklebur	lady's-thumb	scentless chamomile***	volunteer sunflower
cow cockle*	night-flowering catchfly		

Seedlings up to 6 leaf stage

wild tomato

Seedlings up to 8 leaf stage

buckwheat	common groundsel	lamb's-quarters	wild mustard
(wild, tartary, common)	common ragweed	stinkweed	wormseed mustard

* In normal conditions, cow cockle will be controlled up to the 4 leaf stage. Plants beyond this stage are unlikely to be controlled.

** Spray before plants are 5 cm.

*** Spring annuals only.

**** Spray before plants are 8 cm high.

5. Weeds Suppressed: Canada thistle, perennial sow-thistle.

6. When Used: Crop stage: Spring and durum wheat: 2 leaf prior to emergence of 4th tiller.

Weed stage: Wild oats: 1 - 6 leaf stage prior to emergence of 4th tiller. Green foxtail: 1 - 5 leaf stage prior to emergence of 3rd tiller. Broadleaf weeds: Buckwheats, groundsel, lamb's-quarters, ragweed, stinkweed, wild mustard, wormseed mustard up to 8 leaf stage. Wild tomato up to 6 leaf stage. All other broadleaf weeds up to 4 leaf stage.

7. How to Apply: With: Ground equipment. Do not apply by air.

Rate: Signal: 93 mL/ac. Mextrol 450: 400 500 mL/ac. Signal Adjuvant: 0.8% v/v.

Water volume: Minimum of 40 L/ac.

Nozzles: 80° or 110° flat fan. Use 50 mesh nozzle screens.

Pressure: 275 kPa.

Mixing instructions: Use mixing instructions "c" on page 12.

Sprayer cleanup: Use cleanup method B on page 16.

Signal M (cont'd)

- 8. Application Tips:** For optimum results, apply Signal M to actively growing weeds. An early application will maximize crop yields by reducing weed competition. Application of the spray mixture at a 45° angle in the direction of travel will result in improved spray coverage. Do not use flood type nozzles, controlled droplet application equipment, spray foils or hollow cone nozzles. Weeds emerging after application will not be controlled. Do not apply to crop stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result.
- 9. How it Works:** Signal M is absorbed by the leaves and is rapidly translocated to the growing points of leaves and stems. Thorough coverage of the plants is essential for consistent control. Mextrol 450 – Bromoxynil is a contact-type herbicide; therefore, good spray coverage is essential. Inhibits photosynthesis and plant respiration. MCPA is absorbed through the leaves and is readily translocated in the plant.
- 10. Expected Results:**
- Wild oats:** Actively growing wild oats stop growing within 48 hours after treatment. Depending on growing conditions and crop competition, leaves and growing points turn yellow within 1 - 3 weeks after application. Further colour changes and loss of vigour will be observed, followed by browning and complete control 3 - 5 weeks after application.
- Broadleaf weeds:** Small burnt spots on leaf can appear within hours; death can take up to two weeks. Poor results may be expected as a result of poor coverage or poor penetration through the canopy.
- 11. Effects of Rainfall:** Rainfall within 30 minutes of application may reduce the effectiveness of Signal M.
- 12. Movement in Soil:** None.
- 13. Cropping Restrictions:** Do not treat if underseeded with forages.
- Grazing restrictions:** Do not use treated crops for grazing of livestock or green feed until 30 days after application of Signal M. Do not cut treated crops for forage until 30 days after application of Signal M.
- Pre-harvest interval:** 60 days.
- 14. Toxicity:**
- Signal: Acute oral LD₅₀ (rats) = 2,276 mg/kg; Acute dermal (rats) = 4,000 mg/kg.
 - Mextrol 450: Acute oral LD₅₀ (rats) = 365 mg/kg.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Store the product in closed, original container in well ventilated room.
- 17. Resistance Management:** See page 41 for information on resistance management.

Simazine 480 (*simazine*)**Group 5**

Manufacturers: United Agri Products Canada Inc.



Caution Poison

- 1. Formulations:** Flowable; 474 g/L simazine + 6 g/L related actives (PCP# 23181); size 2 x 10 L.
- 2. Registered Mixes:** None.
- 3. Crops:** Corn, established shelterbelts, woody ornamentals and nursery stock, industrial.
- 4. Weeds Controlled:**
- | | | | |
|-------------------|----------------------------|-------------------|----------------|
| annual smartweeds | lady's-thumb | purslane | wild buckwheat |
| barnyard grass | lamb's-quarters | ragweed | wild oats |
| crabgrass | perennials (most seedling) | volunteer clovers | yellow foxtail |
- 5. Weeds Suppressed:** None.

Safety information, see page 25

Simazine 480 (cont'd)

6. **When Used:** Prior to weed emergence. May be applied either in the spring or fall, prior to freeze-up.
7. **How to Apply:** With ground equipment.
 - Corn:** 3.4 - 8.3 L/ha depending on soil type. Even coverage required.
 - Woody ornamentals and nursery stock:** 4.7 - 7 L in 300 L water per hectare in fall or spring prior to weed emergence, directed spray only.
 - Shelterbelts:** Apply 9.4 - 14 L in 500 L/ha before weeds emerge, directed spray only.
 - Industrial:** Annual weeds 23.5 L/ha, shallow rooted perennials 36.5 L/ha, well established perennials 47 L/ha. Apply in 250 - 2,000 L/ha water.
8. **Application Tips:** Rainfall required to move chemical into the root zone for activity.
9. **How it Works:** Acts through the roots of germinating weeds and inhibit photosynthesis.
10. **Expected Results:** Weed-free ground.
11. **Effects of Rainfall:** Negligible.
12. **Movement in Soil:** Very little movement is possible on clay soil, but on sandy ground with high rainfall, some leaching may occur.
13. **Cropping Restrictions:**
 - Succeeding crops:** Plant only corn in the treated area in the same year. Breakdown of simazine in the soil is slow and may cause injury to sensitive crops (e.g. cereals, canola, sugar beets, white beans, onions, peas, tomatoes, turnips) one or more years after application. The risk of damage to succeeding crops from simazine residues may be reduced by ploughing or deep tilling treated fields in the fall prior to seeding the next crop in the rotation. Spreading and incorporating manure may also help to reduce the simazine levels. Uneven application, excessive sprayer overlap or applications in excess of recommended rates will result in a longer carry-over of simazine residues. A prolonged period of hot dry weather will also lengthen the time that simazine residues remain in the soil.
 - Grazing restrictions:** Allow 30 days between application and grazing of dairy, beef cattle, and sheep and 60 days between application and cutting for hay.
14. **Toxicity:** Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) = technical 5,000 mg/kg, Simazine 480 = 5,000 mg/kg. May be irritating to eyes and cause dermatitis.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Store in dry area, heating not required.
17. **Resistance Management:** See page 41 for information on resistance management.

Simplicity (pyroxsulam)

Group 2

Manufacturers: Dow AgroSciences Canada Inc.

1. **Formulations:** Oil dispersion; 30 g/L pyroxsulam (PCP# 28887); 2 x 8 L.
2. **Registered Mixes:** MCPA IV 500: 0.28 - 0.45 L/ac; Attain (Attain A: 180 ml/ac. + Attain B: 300 ml/ac., Benchmark (Benchmark A: 40 ml/ac. + Benchmark B: 485 ml/ac., Curtail M : 600 ml/ac., Frontline XL: 506 ml/ac; Frontline 2,4-D (Frontline 2,4-D "A" : 27 ml/ac + Frontline 2, 4-D "B": 248 ml/ac; Spectrum (Spectrum A: 40 ml/ac, Spectrum B: 600 ml/ac); Bucril M: 400 ml/ac; Thumper: 405 ml/ac, Refine Extra: 8 g/ac plus 0.2% of recommended adjuvant.
3. **Crops:** Spring and durum wheat.

Safety information, see page 25

Simplicity (cont'd)

4. Weeds Controlled:

barnyard grass (1-5 leaf)
common chickweed (to 10 cm)
cleavers (up to 6 whorl)

hemp-nettle (1 - 8 leaf)
lady's-thumb (1 - 5 leaf)

Japanese brome (1-6 leaf)
redroot pigweed (1 - 8 leaf)

wild oats (up to 4 leaf, 2 tillers)
volunteer canola*

* Will not control imidazolinone-tolerant canola.

5. Weeds Suppressed: Green foxtail (1 - 5 leaf), wild buckwheat (1 - 4 leaf).

6. When Used:

Crop stage: Apply to actively growing wheat and durum wheat from 3 leaf until the emergence of the first node.

Weed stage: Wild oats: up to 4 leaf 2 tillers. Green foxtail: 1 - 5 leaf. Chickweed: up to 10 cm.

Cleavers: up to 6 whorl. Hemp-nettle: 1 - 8 leaf. Smartweed (lady's-thumb): 1 - 5 leaf.

Redroot pigweed: 1 - 8 leaf. Volunteer canola (except imidazolinone tolerant): 1 - 6 leaf.

Wild buckwheat: 1 - 4 leaf.

7. How to Apply: Ground equipment or by air.

Rate: 200 mL/ac.

Surfactant: Use surfactant only when Simplicity is applied alone or when tank mixed with Refine Extra. When Simplicity is used alone, use 0.8% v/v Assist in spray solution. When Simplicity is tank mixed with Refine Extra, use adjuvant suggested for use with Refine Extra.

Water volume: 20 - 40 L/ac ground application, 20 L/ac aerial application.

Pressure: Use low pressures 200 - 275 kPa.

Nozzles: Apply with nozzles that produce coarse, uniform spray droplets.

Mixing instructions: Use mixing procedure "b" on page 12.

Do not use surfactant with Simplicity when tank mixing with registered broadleaf tank mix partners unless required by the tank mix partner. If no tank mix partner is being used, then add Assist oil concentrate at 0.8% v/v.

Sprayer clean-out instructions:

Equipment used to apply Simplicity should not be used to apply other pesticides to sensitive crops without thorough cleaning. To avoid subsequent injury to crops other than cereals, all spraying equipment must be thoroughly cleaned both inside and out using cleanout method A on page 16.

8. Application Tips: Only weeds emerged at time of application are controlled. For optimum results, apply Simplicity to actively growing weeds. Best results are obtained from application made to seedling weeds. Weed control may be reduced if Simplicity is applied under stress conditions such as drought, heat, insufficient fertility, flooding or prolonged cool temperatures. Do not apply to crops that are stressed (frost, low fertility, drought or flooding, disease or insect damage) as crop injury may result. Under conditions of low crop competition and high weed density, control may be reduced. If foliage is wet at time of application, control may be decreased.

9. How it Works: Simplicity inhibits the production of the ALS enzyme in plants. This enzyme is essential for the production of certain amino acids, which are essential for plant growth.

10. Expected Results: Simplicity rapidly stops the growth of susceptible weeds. However, typical symptoms (discoloration) of dying weeds may not be noticeable for 1 - 3 weeks following application, depending on growing conditions and weed susceptibility. Degree of control and duration of symptoms depend on weed sensitivity, weed size, crop competition, growing conditions following treatment and spray coverage.

11. Effects of Rainfall: Rain within 4 hours of application may reduce control.

12. Movement in Soil: Simplicity is not persistent in soils. Simplicity herbicide breaks down primarily through microbial degradation. Simplicity is generally not mobile in the soil under prairie conditions.

13. Cropping Restrictions:

Drift: Do not allow spray mist to drift since drift can cause damage to non-target crops and plants. Do not apply in dead calm or when winds are gusty.

Safety information, see page 25

Simplicity (cont'd)

Pre-harvest interval: Leave 60 days between treatment and harvest.

Succeeding crops: Barley, brown mustard, canola, chickpea, dry beans, flax, juncea canola, lentils, oats, field peas, spring wheat, soybean and yellow mustard may be seeded the year following treatment or fields can be fallowed.

Grazing restrictions: Must not be grazed or fed to livestock for 7 days after treating crop.

14. Toxicity: Low acute mammalian toxicity. Acute LD₅₀ (rats) = >3,129 mg/kg.

15. Precautions, First Aid: Check label for first aid information.

16. Storage: Store in original container in a secure, dry, heated storage. This product will freeze at 14°F/-10°C. Do not store below 15°F/-9°C. Allow product to warm above 45°F/7°C before using and thoroughly mix the product prior to use.

17. Resistance Management: See page 41 for information on resistance management.

Solo (imazamox)

Manufacturer: BASF Canada

Group 2



Warning Irritant

1. Formulations: Water dispersible granule; 70% imazamox; 4 x 117 g water soluble bags per case, one case treats 40 acres. Four cases per one 160 acre carton. Clearfield crops (PCP# 28741). Other crops (PCP# 28742).

2. Registered Mixes:

Herbicides: Minor use registration with Basagran Forte (505 mL/ac + 809mL/ac 28% UAN) on dry beans.

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Surfactants: A surfactant must be used with Solo. Use only Merge surfactant at 0.5% Merge v/v.

The surfactant is not included in the package.

Mixing instructions: Use a 50 mesh (or coarser) filter screen. Fill sprayer tank with 3/4 the required amount of clean water, start agitation and continue agitation throughout the entire mixing and spraying procedure. Add the required amount of Solo soluble bag(s) directly into the sprayer tank opening. Agitate for at least 10 minutes to dissolve herbicide. Add the required amount of Merge. Complete filling the tank to the desired level with water.

3. Crops: Clearfield canola, Clearfield lentils, Clearfield sunflowers, Clearfield Xceed canola, field peas.

4. Weeds Controlled:

11.7 g/ac

barnyard grass

cow cockle

green foxtail

green smartweed

lamb's-quarters

Persian dandel

redroot pigweed

shepherd's-purse

stinkweed

volunteer barley

volunteer canary seed

volunteer canola

(not Clearfield varieties)

volunteer durum wheat

volunteer oats

volunteer spring wheat

(non-Clearfield)

wild mustard

wild oats

yellow foxtail

5. Weeds Suppressed: Cleavers, Japanese brome, kochia*, wild buckwheat.

* **Note:** Prairie-wide surveys of kochia fields have found approximately 90% of kochia populations that are Group 2 herbicide resistant. Without testing to confirm, assume the kochia in your field is resistant and will not be controlled by this product alone.

Solo (cont'd)**6. When Used:**

Crop stage: Field peas: 1 to 6 above-ground nodes (1 to 6 true leaves). Clearfield canola, Clearfield Xceed canola: 2 - 6 leaf stage. Clearfield lentils: 2 - 6 leaf stage. Clearfield sunflowers: 2 - 8 leaf stage.

Weed stage: Grasses: 1 to 4 main stem leaves, early until tillering. Broadleaf weeds: cotyledon to 4 leaf stage.

7. How to Apply:

With: Ground equipment only.

Rate: 11.7 g/ac.

Surfactant: Merge surfactant at 0.5% Merge v/v (e.g. 5 L/1,000 L spray solution).

Water volume: 40 L/ac.

Pressure: 275kPa.

Nozzles: 50 mesh screens (or coarser). Flat fan recommended tilted 45° forward for better penetration.

Incorporation: Not applicable.

- 8. Application Tips:** Water soluble bags will dissolve better when kept intact, do not split bags. If agitation is stopped for more than 5 minutes, re-suspend spray solution by full agitation prior to commencing spraying again. Do not spray Solo if temperatures of +5°C or lower are forecasted within 3 days of application. Temperatures near freezing (below 5°C) will prevent optimum herbicide performance, as weeds are not actively growing. Initial transient crop yellowing may be observed after application, but this is outgrown and should not affect yield.

- 9. How it Works:** Absorbed by foliage and roots. Disrupts plant metabolism causing growth to stop. Works best under good growing conditions. Residual activity of small seeded, shallow germinating flushing weeds (not wild oats) expected until crop flowering. Moist conditions result in better residual control.

- 10. Expected Results:** Susceptible weeds stop growing within 24 - 48 hours. Yellow striping and purplish or reddish discolouration of the leaves may occur. Leaves begin to die in 3 - 10 days starting with the youngest and moving to the older leaves. Death of the plant may occur in 1 - 3 weeks.

- 11. Effects of Rainfall:** Do not spray if there is a forecast of rain during or soon after application as the rain may reduce control.

- 12. Movement in Soil:** Product does not leach.

13. Cropping Restrictions:

Minimum interval to harvest: Do not apply within 60 days of harvest.

Succeeding crops: Barley, canaryseed, all types of canola, chickpeas, Clearfield lentils, corn, sunflowers (incl Clearfield varieties), field peas, flax, lentils, oat, spring wheat (including durum) may be seeded the first spring after application. Mustard can be seeded 2 years after treatment. The company recommends that a field bioassay (a test strip grown to maturity) be conducted the year before growing any crops other than those listed above. Contact manufacturer for additional information on recropping intervals.

Grazing: Do not graze treated crop or cut for feed within 20 days of application.

- 14. Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = 5,000 mg/kg. Non-toxic to fish, birds and bees.

- 15. Precautions, First Aid:** Check label for first aid information.

- 16. Storage:** Store at temperatures above 5°C. Keep unused water soluble bags in resealed, original container. Keep packages dry at all time.

- 17. Resistance Management:** See page 41 for information on resistance management.

Spectrum (florasulam + MCPA + clopyralid)

Group 2,4

Herbicides

Manufacturer: Dow AgroSciences Canada Inc.

1. **Formulations:** **Spectrum A:** 50 g/L florasulam SC (PCP# 27031); 0.8 L jug and **Spectrum B:** 50 g/L clopyralid + 280 g/L MCPA Ester EC (PCP# 27032); 12.0 L jug.

2. **Registered Mixes:**

Barley, durum, spring wheat: Assert 300 SC + acidulate. **Durum, spring wheat:** Everest 70 DF solupak (17.4 g/ac) + non-ionic surfactant, Simplicity: 200 mL/ac.

3. **Crops:** Barley, bromegrass (smooth, meadow and hybrid), fescue (chewing, creeping red, hard, tall), forages grasses for seed production (seedling and established), oats, perennial ryegrass, spring wheat (including durum), timothy, wheatgrass (crested and intermediate).

4. **Weeds Controlled:**

annual sow thistle (8.8)	flixweed*	shepherd's-purse (8.9)	volunteer canola (8.9)
Canada thistle (8.0)	hemp-nettle (8.2)	smartweed (8.8)	(all canola)
chickweed (8.8)	lamb's-quarters (8.9)	stinkweed (8.9)	wild buckwheat (8.6)
cleavers (8.8)	perennial sowthistle (7.6)***	stork's-bill (8.1)	wild mustard (9.0)
dandelion (8.4)**	redroot pigweed (8.6)		

* Spring seedlings only.

** Seedlings and over wintered rosettes less than 15 cm.

*** Top growth control only.

5. **Weeds Suppressed:** Dandelion greater than 15 cm and mature plants.

6. **When Used:**

Crop stage: Apply to actively growing spring wheat, barley, oats and forage grasses for seed production (seedling and established). Apply when the majority of the crop is past the 2 leaf stage and up to the 6 leaf stage of the crop. When tank mixing, always check the tank mix partners' recommendations for crop staging restrictions.

Weed stage: Annual broadleaf weeds: 1 - 4 leaf stage, except flixweed, which is best controlled in the 2 - 4 leaf stage. Canada thistle and perennial sow thistle: after all thistles have emerged and when the majority are in the rosette to pre-bud stage.

7. **How to Apply:**

With: Ground equipment only. With a sprayer that can apply 40 L/ac spray solution. Do not apply by air.

Rate: Spectrum A: 40 mL/ac; Spectrum B: 600 mL/ac.

Water volume: 40 L/ac.

Pressure: Use low pressures, 200 to 275 kPa.

Nozzles: Use nozzles that deliver higher volumes and coarser droplets.

Mixing instructions: Only use sprayers with good agitation. Ensure that the sprayer is properly cleaned prior to adding Spectrum. Use mixing procedure "d" on page 13.

Sprayer cleanup: Use cleanup method A on page 16.

8. **Application Tips:** Do not apply to crops underseeded to legumes. Apply Spectrum early post-emergence, to the main flush of broadleaf weeds. Warm, moist conditions that promote active weed growth, small weed size and a competitive crop as well as good growing conditions after application will optimize the weed control provided by Spectrum. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and regrowth may occur. For best results, ensure adequate spray coverage of the target weeds. Only weeds emerged at time of application will be controlled. If the foliage of the weed is wet at time of application, control may be reduced.

Spectrum (cont'd)

9. **How it Works:** Spectrum tank mix is readily absorbed by the weed foliage. The florasulam inhibits the ALS enzyme in plants, resulting in rapid stopping of growth followed by yellowing and reddening of the foliage, followed by the death of susceptible weeds. The clopyralid/MCPA portion of Spectrum B mimics naturally occurring plant hormones and controls the weeds by disrupting normal plant growth patterns. Symptoms include twisting of stems and swollen nodes.
10. **Expected Results:** The weeds susceptible to florasulam will stop growing almost immediately. The weeds turn yellow or reddish. Symptoms such as yellowing and red coloration may not be noticeable for 1 - 2 weeks. Twisting of stems may also be observed on weeds sensitive to Curtail M. Warm, moist conditions, small weed size and a competitive crop will optimize weed control provided by Spectrum.
11. **Effects of Rainfall:** Heavy rainfall immediately after application may wash the chemical off the foliage, and a repeat treatment may be required. Do not apply if rainfall is expected within 6 hours.
12. **Movement in Soil:** Florasulam is not persistent in the soil. Dissipation of florasulam occurs primarily through microbial degradation. Field studies in a wide-variety of soils have shown the half-life of florasulam in soil to range from 2 - 18 days. Florasulam degradation is not affected by soil type or by soil pH, but it is moisture and temperature-dependent. The herbicide is somewhat soluble in water, but is generally not mobile in soil under typical prairie conditions. The clopyralid portion of Curtail M is somewhat soluble in water, but is generally not mobile under typical prairie conditions. MCPA is readily leached from the soil.
13. **Cropping Restrictions:**

Grazing restrictions: Do not graze treated crop or cut for feed within 7 days of application.

Drift: Do not allow spray mist to drift since drift can cause damage to non-target crops and plants. Do not apply when winds are gusty or in excess of 15km/h. When spraying, avoid combinations of pressure and nozzle type that will result in fine particles (mist), which are more likely to drift.

Succeeding crops: Fields treated with Spectrum herbicide tank mix can be seeded the following year to barley, canola, peas, wheat or summerfallowed.

Very dry soil conditions following application can result in a risk of injury to field peas grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive in the year of application (less than 140 mm rain between June 1 and August 31 or less than 175 mm rain in the whole year) delay seeding field peas an additional 12 months (22 months following application). Contact your local Dow AgroSciences representative or retailer for more information before seeding field peas following drought conditions in the previous year.

Do not seed crops other than those listed above for at least one year after treatment. For more cropping and use information, contact your Dow AgroSciences Canada Inc. representative.

Other restrictions: Do not harvest the treated mature crop within 60 days of application.
14. **Toxicity:** Spectrum A has extremely low acute toxicity. Acute LD_{50} = >6,000 mg/kg. Spectrum B (Clopyralid and MCPA) has very low acute toxicity. Acute LD_{50} rats = >2,000 mg/kg. MCPA has moderate acute toxicity. Acute LD_{50} of technical = (700 - 800 mg/kg).
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Store away from food, feedstuffs, fertilizer, seeds, insecticides, fungicides or other pesticides or herbicides. Store in a dry, heated storage. If products are frozen, bring to room temperature and agitate before use. Soak up small amounts of spill with absorbent clays.
17. **Resistance Management:** See page 41 for information on resistance management.

Stellar



Danger Poison

Manufacturer: Dow AgroSciences Canada Inc.

Group 2, 4

Formulations:

Product	Company	Active ingredient	Formulation	Container size
Stellar A (PCP# 29286)	Dow AgroSciences Canada Inc.	Florasulam + Fluroxypyr (102.5 g/liter)	SC	2 X 8.0 L
Stellar B (PCP# 29165)	Dow AgroSciences Canada Inc.	MCPA Ester (600 g/L)	EC	9.33

40 acres to treat per case of Stellar.

Crops and Staging

spring wheat durum wheat barley
2 leaf expanded to 6 leaf stage

Weeds Controlled, Rates and Staging

Weed stage: Apply when weeds are actively growing (2-4 leaf stage). Only weeds emerged at the time of treatment will be controlled. Best results are obtained from applications made to seedling weeds. Follow all precautions, directions for use, and limitations on the tank-mix partner labels.

Rates: StellarA (florasulam + fluroxypyr): 400 mL/ac + Stellar B (MCPA Ester 600 g/L): 240 mL/ac.

Weeds Controlled

burdock	lamb's-quarters	shepherd's purse	volunteer flax
cleavers	plantain	smartweed	wild buckwheat
cocklebur	prickly lettuce	stinkweed	wild mustard
flixweed	ragweed	sunflower(annual)	wild radish
hemp nettle	red root pigweed	vetch	
kochia*	Russian pigweed	volunteer canola	

* Includes ALS resistant biotypes.

Weeds Suppressed

Stork's bill

Stellar is a selective postemergence herbicide for the control of hard-to-kill annual broadleaved weeds in spring wheat (including durum) and spring barley. Stellar is mixed with water and applied as a uniform broadcast spray.

Stellar MUST be applied early postemergence, to the main flush of actively growing broadleaved weeds. Warm, moist growing conditions promote active weed growth and enhance the activity of Stellar by allowing maximum foliar uptake and contact activity. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur. For best results, ensure thorough spray coverage of target weeds. Stellar stops growth of susceptible weeds rapidly. However, typical symptoms (discolouration) of dying weeds may not be noticeable for 1 to 2 weeks after application, depending upon growing conditions and weed susceptibility. Degree of control and duration of effect are dependent on weed sensitivity, weed size, crop competition, growing conditions at and following treatment, and spray coverage.

Tank Mixes

Herbicide tank mix partner	Crops registered	Rate of herbicide tank mix partner	Remarks (adjuvant rate, crop staging and any other restrictions)
Assert 300 SC Herbicide	spring wheat, durum wheat and spring barley	640 mL/ac	Add tank-mix partners in the following order: Stellar A Herbicide, Spray Water pH Adjuster, Assert 300 SC Herbicide, Stellar B Herbicide

Stellar (cont'd)

Herbicide tank mix partner	Crops registered	Rate of herbicide tank mix partner	Remarks (adjuvant rate, crop staging and any other restrictions)
Axial 100 EC Herbicide	spring wheat and spring barley	240 mL/ac	Adigor 280 mL/ac
Everest Solupak 70DF Herbicide*	spring wheat and durum wheat	17.2 g/ac	Non-ionic surfactant (see label) 0.25% v/v. Add tank-mix partners in the following order: Everest Solupak 70DF Herbicide, Stellar A Herbicide, Stellar B Herbicide, adjuvant. Vigorous agitation is required to dissolve Everest Solupak 70DF Herbicide before adding other tank-mix partners.

Tank mixtures of Stellar A and Stellar B with other herbicides will provide control of specified annual grasses. Apply when crops and weeds are actively growing.

Application Information

Water volume: Ground equipment only (40 L/acre).

Nozzle: Use nozzles that deliver higher volumes and coarser droplets.

Pressure: Use low pressures 200-275 kPa.

Mixing Instructions: Use mixing instructions "b" on page 12.

Application Tips**How it Works**

Stellar is readily absorbed by weed foliage. The florasulam component inhibits the ALS enzyme in plants resulting in a rapid halt in plant growth followed by yellowing and most noticeable after 1-2 weeks. The fluroxpyr and MCPA components and mimic plant growth regulators cause swelling and thickening and erratic weed growth followed by yellowing, browning resulting in plant mortality.

Expected Results

Weeds start to discolour and twist shortly after application. Plant growth will cease or become erratic followed by browning and plant mortality.

Effect of Rainfall: Do not apply if rainfall is expected within 2 hours of application.

Restrictions

Re-cropping: Fields previously treated with Stellar can be seeded the following year to barley, canola, oats, peas, or wheat or fields can be summerfallowed.

Grazing Restrictions: Do not cut the treated crop for hay or graze treated crop within 7 days after application.

Pre-harvest Intervals: Do not harvest the treated crop within 60 days after application.

Leaching: This product has potential to leach. Do not apply excessive irrigation.

Buffer zone: A buffer zone of 30 metres is required between the downwind edge of the boom and the closest edge of sensitive terrestrial habitats including forested areas, shelter belts, woodlots, hedgerows, and shrublands. A buffer zone of 15 metres is required between the downwind edge of the boom and the closest edge of sensitive aquatic habitats including sloughs, ponds, prairie potholes, lakes, rivers, streams, wetlands and wildlife habitats at the edge of these bodies of water. Do not contaminate these habitats when cleaning and rinsing spray equipment or containers.

Toxicity

For Stellar A the oral LD₅₀ for rats is >2,000 mg/kg (males) and >5,000 mg/kg (females). Stellar B has moderate acute toxicity. LD₅₀ of technical = 700-800 mg/kg.

Storage

Store in original containers in a secure, dry heated storage. If product is frozen, bring to room temperature and agitate before use.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.

Safety information, see page 25

Target/Sword/Tracker XP

(MCPA + mecoprop-p + dicamba)

Group 4

Manufacturer: Syngenta Crop Protection/United Agri Products Canada Inc./Interprovincial Co-operatives



Caution Poison

- Formulations:** Liquid; 275 g/L MCPA + 62.5 g/L mecoprop-p + 62.5 g/L dicamba; 2 x 10 L pack.
Target (PCP# 28028). Sword (PCP# 27892). Tracker XP (PCP# 27790).
- Registered Mixes:** Horizon 240 EC (95 or 115 mL/ac + Score), Horizon NG (376 mL/ac) (wheat only), Afolan F* (barley, wheat), Lorox L (barley, wheat), Sencor (barley, wheat), Linuron 480* (wheat, barley).
Sword* + Everest + Agral 90.
* Tracker XP registered for mixing only with Horizon (95 or 115 mL/ac + Score), Sencor and Lorox L.

3. Crops:

annual canary seed (9.0)	durum wheat (8.8)	oats (9.0)	winter wheat (8.6)
barley (8.5)	hard red spring wheat (8.4)	summerfallow (thistle control)	

Target/Sword only:

Seedling and established grasses grown for forage

creeping red fescue	intermediate wheatgrass	orchard grass	timothy
crested wheatgrass	meadow foxtail	smooth brome	

Additional established grasses grown for forage:

Kentucky bluegrass	meadow fescue	slender wheatgrass	tall wheatgrass
meadow brome	pubescent wheatgrass	tall fescue	western wheatgrass

Note: Tracker XP not registered for use with seedling and established grasses grown for forage.

4. Weeds Controlled:

annual smartweeds (8.0)	cow cockle (8.5)	night-flowering catchfly (7.5)	volunteer buckwheat
annual sow thistle	flixweed (8.5)	prostrate pigweed (8.5)	volunteer mustards
ball mustards	hemp-nettle	redroot pigweed (8.5)	volunteer rapeseed (9.0)
chickweed*	knotweed	Russian thistle (8.5)	volunteer sunflowers (8.3)
cleavers (7.5)	kochia (8.0)	shepherd's-purse	wild buckwheat (8.5)
common ragweed	lady's-thumb	stinkweed (8.8)	wild mustards (8.8)
corn spurry (8.8)	lamb's-quarters (8.7)	tartary buckwheat (8.5)	wormseed mustards

* Only in tank mix with Afolan F, Lorox L and Sencor.

- Weeds Suppressed:** Canada thistle (6.6), field bindweed, hedge bindweed, perennial sow thistle.
- When Used:** Annual canary seed, durum wheat, oats, spring wheat: 2 - 5 leaf stage. Barley: 2 - 4 leaf stage. Winter wheat: apply in spring before crop is more than 30 cm tall. Seedling grasses grown for forage: 2 - 4 leaf stage. Weed growth stage: 2 - 5 leaf stage. Cleavers (1 - 2 whorl), hemp-nettle (before second pair of true leaves), Russian thistle (less than 5 cm). Summerfallow: Canada thistle is in the early bud stage. Post harvest (stubble): Canada thistle actively growing 15 - 20 cm, do not apply within 2 weeks of a killing frost. Use the higher rate when weeds are beyond the 3 leaf stage, when weed densities are high, when weeds are not actively growing due to extended periods of hot and dry or cold and wet weather prior to application or for control of overwintering flixweed, shepherd's-purse and stinkweed.

7. How to Apply:

With: Ground or air.

Rate: 400 - 600 mL/ac. For Canada thistle, cleavers, field bindweed, hedge bindweed, hemp-nettle, perennial sow thistle, volunteer canola, winter annuals: 600 mL/ac. Summerfallow: 800 mL/ac. Post harvest (stubble): 800 mL/ac.

Water volume: Ground: 40 L/ac. Air: 12 L/ac (minimum).

Target/Sword/Tracker XP (cont'd)

Pressure: 200 - 300 kPa.

Nozzles: Flat fan recommended.

8. **Application Tips:** In winter wheat, spray winter annuals as soon as growth begins in spring. Do not let contents stand for long periods. Agitate every 8 hours.
9. **How it Works:** A combination of 3 systemic hormonal herbicides that accumulate in the growing point of susceptible plants, produce abnormal growth and disrupt the transport system in plants.
10. **Expected Results:**

Weeds: Can take up to 7 - 14 days depending on weather and growing conditions. Leaves curl, leaf edges turn brown, petioles twist, plant ceases growth and turns brown and dies.

Crop: Improper or untimely application can result in abnormal bending at the nodes of grain stalks, difficulty in head emergence from sheath, curled awns, malformed kernels and sterile florets. Under certain conditions, straw shortening may occur but yield will not be affected. **Poor results may be expected if** there is poor coverage, rainfall less than 3 hours after application or weeds are too advanced. Dicamba containing products can be hard on crops if incorrectly applied.
11. **Effects of Rainfall:** Rainfall within 3 hours will reduce activity.
12. **Movement in Soil:**

MCPA/mecoprop: Readily mobile in the soil.

Dicamba: Relatively mobile; mobility affected by capillary movement and/or surface evaporation. Concentration and location in the soil profile will be determined by total seasonal precipitation, its frequency and original herbicide dosage.
13. **Cropping Restrictions:** Cereal and broadleaf crops can be grown the year following application.

Grazing restrictions: Do not graze or harvest for livestock feed within 7 days of application. Most vegetables and fruit crops are very sensitive to drift.
14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = MCPA 100 - 500 mg/kg, mecoprop = 930 mg/kg, dicamba = 2,629 mg/kg, target = 1,600 mg/kg. Non-toxic to fish. Toxic to bees.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Heated storage only.
17. **Resistance Management:** See page 41 for information on resistance management.

Telar (chlorsulfuron)

Manufacturer: E. I. duPont Canada Co.

Group 2



Caution Poison

1. **Formulations:** Dry flowable; 75% (PCP# 21533); 500 g (5 x 100 gram water soluble bags).
2. **Registered Mixes:** Telar Toss-N-Go (48 g/ac) + Krovar I (2.75 - 3.6 kg/ac + surfactant); Telar Toss-N-Go (6 g/ac) + 2,4-D Amine (0.32 - 0.45 L/ac) or 2,4-D Ester (0.24 - 0.32 L/ac).

Surfactants: Ag-Surf, Agral 90, Citowett plus, Companion, Super Spreader.

Suggested sequentials: Atrazine, Hyvar X, Hyvar X-L, Karmex DF, Krovar I, Princep, Spike, or Velpar.

Mixing instructions: Fill the spray tank 1/4 - 1/3 full with clean water. Add the recommended number of Telar Toss-N-Go bags to the spray tank while agitator is running. Continuous agitation is required to keep Telar herbicide in suspension. After Telar Toss-N-Go Bags have fully dissolved and Telar is in suspension,

Telar (cont'd)

other tank mix components may be added while continuing to full the tank with water. The proper sequence for tank mix components is as follows:

1. dry formulations,
2. emulsifiable concentrates,
3. surfactants.

If a drift control agent is to be tank mixed, it is to be added last.

For repeat loads, reduce the tank heel to 10% or less of the previous load. Fill tank with clean water as described in step 1, and continue as directed. Emulsifiable concentrates may make dispersion of Telar more difficult. For that reason, tank heels of the previous tank mix should be kept to 10% or less of the spray tank volume. Do not allow the spray mixture to remain in the tank for more than 24 hours before spraying, or the effectiveness may be reduced. If the spray mixture has been allowed to stand in the tank, use vigorous agitation to thoroughly disperse before resuming spraying.

- 3. Crops:** Non-crop land such as lumber yards, petroleum tank farms, plant sites, railroads and storage areas where the object is to achieve and maintain control of all vegetation.

4. Weeds Controlled:

Telar at 6 g/ac + 2,4-D

annual sunflower	hemp-nettle	plantain	stinkweed
ball mustard	kochia*	prickly lettuce	stork's-bill
common ragweed	lady's-thumb	redroot pigweed	sweet clover
cow cockle	lamb's-quarters	Russian pigweed	volunteer rapeseed
flixweed	narrow-leaved hawk's-	Russian thistle	wild mustard
green smartweed	beard (spring seedlings)	shepherd's-purse	

* **Note:** Prairie-wide surveys of kochia fields have found approximately 90% of kochia populations that are Group 2 herbicide resistant. Without testing to confirm, assume the kochia in your field is resistant and will not be controlled by this product alone.

Telar alone at 12 g/ac

blue bur	flixweed	lamb's-quarters	stinkweed
chickweed	green smartweed	redroot pigweed	stork's-bill
common groundsel	hemp-nettle	scentless chamomile	volunteer rapeseed
corn spurry	lady's-thumb	shepherd's-purse	wild mustard
cow cockle			

Telar alone at 16 g/ac Weeds controlled at 12 g/ac, plus wild carrot

Telar alone at 28 g/ac Weeds controlled at 16 g/ac, plus common tansy, kochia, Russian thistle, sweet clover

Broadleaf weed control in non-crop land (where vegetation is not desirable).

This rate of Telar Toss-N-Go Bags may cause severe injury for certain grass species.

Telar alone at 48 g/ac

Weeds controlled at 28 g/ac, plus	Canada thistle	narrow-leaved	wild buckwheat
	dandelion	hawk's-beard	
	horsetail		

- 5. Weeds Suppressed: Telar (alone) 28 g/ac:** Canada thistle, dandelion, golden rod, horsetail, perennial sow thistle, wild rose, wild strawberry.

Telar (alone) 48 g/ac: Golden rod, perennial sow thistle, wild rose, wild strawberry, willow.

6. When Used:

Weed stage: Apply when weeds are small (less than 10 cm tall). Under adverse conditions the addition of a recommended surfactant at 1 L/1,000 L spray solution may improve control of weeds.

7. How to Apply:

With: Ground equipment. Do **not** apply by air.

Rate: Alone at 12, 16, 28 or 48 g/ac. At 6 g/ac when tank mixing with 2,4-D and at 28 g/ac when tank mixing with Krovar I.

Telar (cont'd)

Surfactant: 1 L/1,000 L spray solution.

Water volume: Not less than 40 L/ac. Spray volumes of 80 - 160 L/ac are recommended.

Pressure: 275 kPa.

Nozzles: 50 mesh or larger screens. Only metal or nylon filters.

Sprayer cleanup: If the sprayer is to be used to spray sensitive crops or ornamentals, thoroughly remove all traces of Telar herbicide from the mixing and spray equipment immediately after spraying using cleanup method A on page 16.

8. **Application Tips:** Select a spray volume that will ensure thorough coverage and uniform spray pattern. Best results are obtained when weeds are actively growing.
9. **How it Works:** Absorbed through the roots and foliage. Inhibits cell elongation.
10. **Expected Results:** Telar rapidly inhibits growth of susceptible weeds. Typical symptoms (discolouration) of dying weeds may not be noticeable for 1 - 3 weeks after application depending on growing conditions and weed susceptibility. Degree of control and duration of effect depend on the following factors: rate used, weed sensitivity and weed size, growing conditions at and following treatment, precipitation, soil organic matter and pH.
11. **Effects of Rainfall:** Rainfall within 2 hours may lessen degree of weed control. Residual control of weeds germinating after spray application as achieved when Telar herbicide is carried into the root zone by rainfall. For best results, sufficient rainfall to move Telar 5 - 7 cm deep into the soil is required after application, before weeds develop an established root system and grow beyond the seedling stage.
12. **Movement in Soil:** Movement is restricted by finely textured soils, soil organic matter and neutral-to-acidic conditions.
13. **Cropping Restrictions:** For use on non-crop land only.
14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = 5,919 mg/kg.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Store in a cool, dry place. Telar Toss-N-Go Bags are dry flowable granules contained within a water soluble film. The water soluble film dissolves readily in water. Reseal unused Toss-N-Go Bags into cardboard cylinder when not in use.
17. **Resistance Management:** See page 41 for information on resistance management.

Tensile



Caution Poison

Manufacturer: BASF Canada/Dow AgroSciences

Group 2, 4

Formulations:

Product	Company	Active ingredient	Formulation	Container size
Solo	BASF Canada	Imazamox	70% dispersable granule	2 x 117.5 gm
Lontrel Dry	Dow AgroSciences	Clopyralid	75% dispersable granule	809.6 gm

Note: Merge adjuvant not supplied. 40 acres to treat per package.

Crops and Staging

Crop	Stage	Rate per acre
Clearfield canola	2 to 6 leaf stage	11.7 gm/ac of Solo + 40 gm/ac of Lontrel + Merge adjuvant at 0.5L/100L of spray solution

Tensile (cont'd)

Weeds Controlled, Rates and Staging

Weed stage: Leaf stage, unless otherwise noted in the weed table.

Rates:**Weeds Controlled****Grassy weeds 1 – 4 main stem leaves, early until tillering**

barnyard grass	persian darnel	volunteer oats	vetch
green foxtail	volunteer barley	volunteer wheat (not Clearfield varieties)	volunteer canola
Japanese brome*	volunteer canaryseed		wild oats
			yellow foxtail

Broadleaf weeds – cotyledon to 4 leaf stage

Canada thistle**	kochia*	stinkweed	wild buckwheat
cleavers*	lamb's-quarter	volunteer canola (not Clearfield varieties)	wild mustard
cow cockle	red root pigweed		
green smartweed	shepherd's-purse		

* Suppression only

** Top growth control only.

Tank Mixes: No registered tank mixes.

Application Information

Water volume: Ground (40 L/acre).

Nozzle and pressure: Max 40 psi (275 kPa) with flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a 50 mesh or coarser screen.

Application Tips

Do not spray Tensile if temperatures of +5°C or lower are forecasted within 3 days of application. Temperatures near freezing (below 5°C) will prevent optimum herbicide performance, as weeds are not actively growing.

How it Works

Lontrel (clopyralid) is a systemic, hormone-type herbicide. It is absorbed by leaf and stem surfaces and is readily translocated. Maximum efficacy results from foliar application to young, actively growing plants. Solo is absorbed by foliage and roots. It disrupts plant metabolism causing growth to stop. Works best under good growing conditions. Residual activity of small seeded, shallow germinating flushing weeds (not wild oats) expected until crop flowering. Moist conditions result in better residual control.

Expected Results

Lontrel symptoms on affected plants include swollen growing points and roots, cupping of leaves, twisted and distorted stems and leaves. Plants will gradually stop growing and change colour, first to dark green and then to yellow before turning brown as they die. Maximum effectiveness results from foliar applications to young, actively growing plants. Death of weeds may not occur until 14 - 21 days after application. With the lowest rate of Lontrel on Canada thistle, some regrowth may occur by the end of the season, but this will not interfere with harvesting of the crop. Solo causes susceptible weeds to stop growing within 24 - 48 hours. Yellow striping and purplish or reddish discolouration of the leaves may occur. Leaves begin to die in 3 - 10 days starting with the youngest and moving to the older leaves. Death of the plant may occur in 1 - 3 weeks.

Effect of Rainfall: Do not spray if there is a forecast of rain during or soon after application as the rain may reduce control.

Restrictions

Drift: Small amounts of drift may damage sensitive plants such as legumes.

Succeeding crops: Fields treated with Lontrel can be seeded to barley, canola, forage grasses, flax, mustard, oats, rye, wheat or summerfallowed. Do not seed to crops other than those listed above for at least one year after treatment.

Use of straw and manure from treated crops: Lontrel residues in straw may be harmful to susceptible plants. Do not use straw from treated crops for composting or mulching on susceptible broadleaf crops. Manure can be spread on fields that will be seeded to barley, flax, oats, canola (rapeseed), rye or wheat. Do not grow susceptible crops such as peas, beans, lentils, potatoes, sunflowers or other sensitive crops on land that has been mulched with straw containing Lontrel 360 residues within the last 12 months.

Tensile (cont'd)

Grazing restrictions: Crops or areas treated with this product may be grazed immediately following treatment. Sugar beets – Do not apply within 90 days of harvest. Strawberry – P.H.I. = 200 days.

Other restrictions: Sugar beet pre-harvest interval is 90 days. Strawberry pre-harvest interval is 200 days.

Environmental Hazards

See entries for Lontrel and Solo.

Leaching characteristics: See entries for Lontrel and Solo.

Runoff characteristics: See entries for Lontrel and Solo.

Toxicity

Solo has low acute mammalian toxicity. Acute oral LD_{50} (rats) = 5,000 mg/kg. Non-toxic to fish, birds and bees. Lontrel has Very low acute mammalian toxicity. Acute oral LC_{50} (rats) = >2,000 mg/kg. Acute oral LD_{50} (bees) = >100 µg/bee. Extremely low toxicity to fish.

Storage

Store away from food, feedstuff, fertilizer, seeds, insecticides, fungicides or other pesticides or herbicides intended to be used on crops sensitive to Lontrel Dry. Store in heated storage; if product is frozen, bring to room temperature and agitate before use. Keep packages dry at all time.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.

Thumper/Approve/Thrasher/ Leader *(bromoxynil + 2,4-D)*

Group 6,4

Manufacturer: Bayer CropScience/Nufarm Agriculture/MANA Canada/Interprovincial Co-operatives



Warning Poison

- Formulations: Thumper:** Emulsifiable concentrate; 280 g/L bromoxynil + 280 g/L 2,4-D (PCP# 22659); 2 x 8 L jugs, 128 L. **Approve** (PCP# 28123), 10L, 100L, 450L/**Thrasher** (PCP# 28779)/**Leader** (PCP# 28853): Emulsifiable concentrate; 225 g/L bromoxynil + 225 g/L 2,4-D Ester; 2 x 100 L jugs, 450 L.
- Registered Mixes:** Achieve Liquid, Achieve 80DG (barley, wheat); Avenge (barley, spring wheat); Everest (wheat) (**not** to be mixed with Leader); Horizon/Signal Herbicide (spring wheat, durum wheat); Puma¹²⁰ Super (barley, spring wheat, durum wheat). Refer to Achieve 80DG label for mixing instructions. All formulations may be recommend in tank mix with other products. Consult the label of the tank mix partner, and follow the most stringent set of precautions, restrictions and directions for use.
- Crops:** Barley, durum wheat, spring wheat.
- Weeds Controlled:**

American nightshade	cow cockle	night-flowering catchfly	stinkweed
ball mustard	flixweed	pale smartweed	tartary buckwheat
bluebur	green smartweed	redroot pigweed	volunteer canola
cocklebur	kochia	(triazine resistant)	volunteer sunflower
common buckwheat	lady's-thumb	Russian thistle	wild buckwheat
common groundsel	lamb's-quarters	shepherd's-purse	wild mustard
common ragweed			
- Weeds Suppressed:** None.
- When Used:**

Crop stage: Barley, durum wheat, spring wheat: 4 leaf to early flag leaf.

Safety information, see page 25

Thumper/Approve/Thrasher/Leader (cont'd)

Weed stage: Up to 4 leaf stage. Buckwheats, groundsel, lamb's-quarters, stinkweed, wild mustard: up to 8 leaf stage. Kochia, Russian thistle: up to 5 cm high. Velvet leaf: up to 8 cm high.

7. How to Apply:

With: Aircraft or ground equipment.

Rate: Thumper: 405 mL/ac. Approve/Thrasher/Leader: 500 mL/ac.

Water volume: Ground: 20 - 40 L/ac. Air: 12 L/ac or more. When majority of weeds including cow cockle, pigweed or smartweed, a minimum water volume of 16/ac by air is recommended.

Pressure: 275 kPa.

Nozzles: Flat fan recommended. Hollow cone (air only).

8. Application Tips: Do not treat cereals underseeded with forages. For best results, spray when weeds are in the seedling stage and actively growing. Application before the 4 leaf stage may injure the crop.

9. How it Works: Bromoxynil is a contact type herbicide; therefore, good spray coverage is essential. Inhibits photosynthesis and plant respiration. 2,4-D is a hormone type herbicide which causes abnormal growth, affects respiration, food reserves and cell division in broadleaf plants. Absorbed primarily by leaves and stems and translocated to the growing tips and roots.

10. Expected Results: Small burn spots on the leaf can appear within hours; death takes up to 2 weeks.

11. Effects of Rainfall: Rainfall within 2 hours of application may reduce weed control.

12. Movement in Soil: Leaching does not pose a problem.

13. Cropping Restrictions: Grazing restrictions: Do not graze or harvest for greenfeed until 30 days after treatment. Withdraw meat animals 3 days before slaughter. **Succeeding crops:** No restrictions.

14. Toxicity: Moderate acute mammalian toxicity. Intake of a large dose may cause convulsions, sudden collapse and coma. Can be absorbed through the skin. Very toxic to fish.

15. Precautions, First Aid: Check label for first aid information.

16. Storage: Does not require heated storage.

17. Resistance Management: See page 41 for information on resistance management.

Titanium (tralkoxydim + bromoxynil + 2,4-D ester)

(Group 1,6,4)

Manufacturer: Nufarm Agriculture Inc.

1. Formulations: Achieve Liquid: 400 g/L tralkoxydim (PCP# 27011); 4 L, 90 L. **Approve** (PCP# 28123): 225 g/L bromoxynil + 225 g/L 2,4-D Ester; 10 L, 2 x 112.5 L. **Turbocharge** (PCP# 23135): 4 L, 90 L.

2. Registered Mixes: None.

3. Crops: Barley, spring and durum wheat.

4. Weeds Controlled:

American nightshade	cow cockle (7.8)	pale smartweed (8.2)	volunteer rapeseed (8.7)
ball mustard	flixweed (5.7)	Persain daniel (8.0)	volunteer sunflower
barnyard grass (8.0)	green foxtail (8.3)	redroot pigweed (7.9)	wild buckwheat (8.1)
bluebur	green smartweed	Russian thistle (7.1)	wild mustard (8.4)
cocklebur	kochia (6.7)	shepherd's-purse (6.0)	wild oats (8.3)
common buckwheat	lady's-thumb	stinkweed (8.9)	yellow foxtail
common groundsel	lamb's-quarters (8.6)	tartary buckwheat (8.5)	
common ragweed	night-flowering catchfly (7.8)	volunteer oats	

5. Weeds Suppressed: Canada thistle (4.9), perennial sow thistle.

Safety information, see page 25

Titanium (cont'd)

6. When Used:

Crop stage: Barley (all 2 and 6 row varieties) and spring wheat (including durum): 4 leaf to early flag leaf.

Weed stage: Barnyard grass: 1 - 4 leaf stage; green foxtail: 1 - 5 leaf stage (up to emergence of second tiller); Persian dandelion: 1 - 4 leaf stage; wild oats: 1 - 6 leaves (total leaves including tillers).

Broadleaf weeds: All - up to the 4-leaf stage. Buckwheats, groundsel, lamb's-quarters, stinkweed, wild mustard - up to the 8-leaf stage. Kochia, Russian thistle - up to 5cm high.

7. How to Apply:

With: Ground equipment only.

Rate: Achieve Liquid: 200 mL/ac. Approve: 500 mL/ac. Turbocharge: 0.5% v/v (or 1 L/200 L of water).

Water volume: 20 - 40 L/ac.

Pressure: 30 - 40 psi (200 - 275 kPa).

Nozzles: Flat fan recommended, tilted 45° forward for better penetration. 50 mesh screens and filters.

Hard water: Add ammonium sulfate at 0.75 - 1.5 kg /100 L (7.5 - 15 lb/100 gallons) of water when water analysis indicates bicarbonate (BCO_3) levels are 400 ppm or greater.

Mixing instructions:

1. Use Titanium in previously cleaned sprayers with good agitation. Agitation should be used throughout mixing.
2. Fill sprayer 3/4 of the required volume of clean water. Add ammonium sulfate, if required.
3. Add the Achieve Liquid required to the spray solution.
4. Add the Approve required to the spray solution.
5. Add the Turbocharge adjuvant, and complete filling the sprayer tank with water to the desired final water volume.

Note: Titanium must be sprayed within the same day of mixing.

8. Application Tips:

Weed control: Optimum weed control is obtained by applying herbicides when targeted weeds are actively growing. Applying herbicides to crops under stress (drought, heat, frost, poor soil fertility, flooding or prolonged cool temperatures) may delay or reduce weed control.

Crop safety: Applications of Titanium to non-tillered crops exposed to 4°C temperatures before or after spraying should be avoided to prevent the possibility of crop injury. Tillered cereal crops may incur injury if Titanium is sprayed within 48 hours of freezing temperatures.

9. **How it Works:** Achieve is a systemic herbicide that is absorbed through the leaves and translocated to the growing points within the plant where it starts killing the susceptible grasses. Thorough coverage of the foliage is important for consistent grass control. Approve contains two components: bromoxynil and 2,4-D. Bromoxynil is a contact-type herbicide; therefore, good spray coverage is essential. Inhibits photosynthesis and plant respiration. 2,4-D is a hormone-type herbicide that causes abnormal growth, affects respiration, food reserves and cell division in broadleaf plants. It is absorbed primarily by leaves and stems and translocated to the growing tips and roots.

10. Expected Results:

Grassy weeds: Growth stops in 48 hours. Young shoot turn brown in 7 - 8 days. Complete death of plant will take 2 - 3 weeks.

Broadleaf weeds: Small burnt spots on the leaf can appear within hours; death takes up to two weeks. Poor results may be expected as a result of poor coverage or poor penetration through the canopy.

11. **Effects of Rainfall:** No effect 1 hour after application.

12. **Movement in Soil:** The amount of leaching is very low.

13. Cropping Restrictions:

Succeeding crops: No restrictions.

Titanium (cont'd)

Grazing restrictions: Immature crops may be grazed or cut for hay 30 days after treatment. Mature straw may be fed to livestock.

Pre-harvest interval: 60 days.

14. **Toxicity:** Moderate acute mammalian toxicity. Intake of a large dose may cause convulsions, sudden collapse and coma. Can be absorbed through the skin. Very toxic to fish.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Store in a cool, dry place away from children, animals, food, feed or fertilizers. Keep unused product in resealed original container. Store above -5°C. Shake well before reuse.
17. **Resistance Management:** See page 41 for information on resistance management.

Tordon 22K (picloram)

Group 4

Manufacturer: Dow AgroSciences Canada Inc.



Caution Poison

Note: Tordon 22K – Rangeland and pasture applications do not require a licenced pesticide applicator. All other applications require a licenced applicator.

1. **Formulations:** Solution; 240 g/L (PCP# 9005); 3.6 L and 10 L jug.
2. **Registered Mixes:** None.
3. **Crops:**

Tordon 22K: Permanent grass pastures, rangeland, spot treatment on cultivated cropland, utility rights-of-way and roadsides.

4. **Weeds Controlled:**

Tordon 22K:

Group 1: Scentless chamomile.

Group 2: Diffuse knapweed, spotted knapweed.

Group 3: Canada thistle, pasture sage, poverty weed, Russian knapweed, sow thistle.

Group 4: Field bindweed, leafy spurge, toadflax.

5. **Weeds Suppressed:** None.

6. **When Used:**

Tordon 22K: Any time when, green fully developed leaves are present.

7. **How to Apply:**

Tordon 22K: Boom, handgun or backpack.

Rate:

Tordon 22K	Tordon 22K per 100m ²
Group 1: 445 mL/ac	Group 1: 11 mL
Group 2: 910 mL/ac	Group 2: 22 mL
Group 3: 1.8 L/ac	Group 3: 45 mL
Group 4: 3.6 L/ac	Group 4: 90 mL

Tordon 22K (cont'd)

Water volume:**Tordon 22K:** 160 - 324 L/ac.**Nozzles:** Flat fan recommended.

8. **Application Tips:** Tordon 22K used as a spot treatment in a crop. No spot treatment should exceed 1 acre, and the total area treated in any 1 field in a year should not exceed 5% of the field.
Note: Picloram is extremely persistent and water soluble. Small quantities may cause damage to desirable plants. Do not apply or permit any Tordon to contaminate soil used to grow desirable, susceptible plants. Do not contaminate water used for irrigation or domestic purposes.
9. **How it Works:** Interferes with cell division, causing leaf cupping, stem distortion and eventual death of plant. Tordon 22K is absorbed through leaves and roots.
10. **Expected Results:**
Tordon 22K: Perennial weeds show distorted stems and cupped leaves, which turn yellow and then brown. Usually native grass increases in abundance as a result of reduced competition.
11. **Effects of Rainfall:** Heavy rainfall shortly after application may carry picloram away from the target area.
12. **Movement in Soil:** Picloram is very soluble in water and moves with water in coarsely textured soils.
13. **Cropping Restrictions: Grazing restrictions:** Do not graze dairy animals in treated area within 6 weeks after treatment. For Tordon 101, withdraw meat animals from treated fields 3 days prior to slaughter. Manure from picloram treated vegetation should not be used to grow sensitive crops but rather be returned to a cereal crop field. When applied as a spot treatment on cropland, picloram may persist in soil for up to 5 years and prevent the establishment of sensitive crops.
Succeeding crops:
1st year: Oats.
2nd year: Oats or barley.
3rd year: Oats, barley or wheat. A reduction in yield in the 1st year is usually offset by benefits of weed control obtained. Legumes may not be established in a pasture for several years after a Tordon treatment. If legumes are essential in a pasture, do not use Tordon.
14. **Toxicity:** Tordon 22K = >5,000 mg/kg.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Tordon 22K: Store in a cool, dry place. Do not freeze. If freezing occurs, bring to room temperature and mix thoroughly.
17. **Resistance Management:** See page 41 for information on resistance management.

Touchdown iQ/Touchdown Total are under Glyphosate.



Caution Irritant Caution Poison

Trifluralin (Advance 10 G/Bonanza/Rival/Treflan)

Manufacturer: Dow AgroSciences, NuFarm, United Agri-Products Canada Inc.

Herbicide Group 3

Formulations:

Product	Company	Active ingredient	Formulation	Container size
Advance 10 G (PCP# 21742)	Dow AgroSciences	10%	Granules	22 kg bag, 454 kg bulk bag
Bonanza 10G (PCP# 22744)	United Agri-Products	10%	Granules	22 kg bag, 500 kg bulk bag
Bonanza 480 EC (PCP# 28289)	United Agri-Products	480/L	EC	9.45 L, 205 L

Safety information, see page 25

Product	Company	Active ingredient	Formulation	Container size
Rival 10 G (PCP# 18926)	NuFarm	10%	Granules	22 kg bag, 454 kg bulk bag
Rival EC (PCP# 18612)	NuFarm	500 g/L	EC	9 L, 110 L
Treflan EC (PCP# 23933)	Dow AgroSciences	480/L	EC	9.45 L, 115 L

Oilseed and Special Crops

Crops and Staging

Not all the trifluralin formulations are registered for the crops listed below. Please refer to the specific product label for details. Granules applied in the fall only (after Sept. 1 but before soil freeze-up). All products are for pre-plant-incorporated use only.

Alfalfa establishment (flax and canola cover crops only)	Dry common beans (kidney, white)	Lentils (fall only) (8.5)	Sweet clover
Asparagus (established – 3 years)	Faba beans	Peas (field, canning)	Transplanted shelterbelts
Barley (fall only for granular products)	Flax (summer and fall only) (7.7)	Safflower	Vegetables (broccoli, brussel sprouts, cabbage, cauliflower, carrots, rutabaga, trans-planted tomatoes)
Black beans	Forage legumes (seedling)	Saskatoon berries	
Canola (8.9)	alsike clover, red clover, cicer milkvetch, bird's-foot trefoil)	Soybeans	
		Strawberries	
		Sunflower (8.9)	

Weeds Controlled

annual bluegrass (8.6)	cow cockle (9.0)	lamb's-quarters	purslane
barnyard grass (8.3)	crabgrass	millet (green and yellow foxtail)*	Russian thistle
carpetweed	goosegrass	meadow brome grass	stink grass
cheat (downy brome grass) (5.9)	knotweed	pigweed	wild oats**
chickweed (7.1)			wild buckwheat

* Excluding group 3 resistant foxtails.

** Suppression

Spring Application: Trifluralin can be applied immediately prior to planting or up to three weeks before planting.

Summer Application: Trifluralin can be applied to summerfallow between June 1 and September 1 for weed control in canola or flax the following year. Apply the summer rate and incorporate (see Incorporation section). Not recommended for sand and sandy loam soils. Trifluralin must be incorporated at least twice with the implement operated in two different directions. The initial incorporation must be done within 24 hours after application. The second incorporation (and subsequent incorporations) may be done whenever necessary to destroy resistant weed growth during the remainder of the fallow season. Shallow tillage (5 to 8 cm) is necessary in the spring prior to planting.

Summerfallow: Advance 10G, Bonanza 10G, Rival 10G can also be applied to summerfallow in May, June or July for weed control during both years of a fallow-wheat rotation or in the fall (September – prior to soil freeze-up) prior to spring and durum wheat seeding.

Weeds Controlled

Fallow Year

barnyard grass	persian darnel	Russian thistle	wild millet (green foxtail)*
cow cockle	redroot pigweed	wild buckwheat	wild oats (suppression)
lamb's-quarters			

* Excluding group 3 resistant foxtails.

Crop Year

wild millet (green foxtail)*	lamb's-quarters	wild buckwheat	wild oats
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Fall Application: Trifluralin can be applied in the fall between September 1 and prior to soil freeze-up for weed control the following year. Apply fall rates and incorporate twice. The initial incorporation must be done within 24 hours after application. It is preferred to do both incorporations in the fall followed by tillage (5 to 8 cm) in the spring prior to planting. However, one incorporation may be done in the fall and the second in the spring at the time of seedbed preparation, provided both operations are done at the recommended depth. **Note:** Do not apply to stubble when the previous crop was treated with another trifluralin product (Advance, Bonanza, Rival or Treflan). This includes the application the previous summer or fall.

Trifluralin (cont'd)

Rates

Spring Applications

Crop	Soil texture and soil organic matter (%)			
	Light (sand – sandy loam)		Medium – heavy (loam to clay)	
	2 – 5%	6 – 15%	2 – 12%	6 – 15%
Field Crops: Asparagus, black beans, crambe, dry beans (field & kidney), faba beans, mustard, peas (field & canning), canola, safflower, sainfoin, sunflowers				
Bonanza EC	0.69 L/acre	0.69 L/acre	0.93 L/acre	0.93 L/acre
Rival EC	0.65 L/acre	0.89 L/acre	0.89 L/acre	0.89 – 1.13 L/acre
Treflan EC	0.69 L/acre	0.93 L/acre	0.93 L/acre	0.93 – 1.21 L/acre
Shelterbelts: American elm, caragana, green ash, Scotch pine and Siberian elm				
Bonanza EC	1.86 L/acre	3.72 L/acre	3.72 L/acre	3.72 L/acre
Rival EC	1.80 L/acre	3.6 L/acre	3.6 L/acre	3.6 L/acre
Treflan EC	1.9 L/acre			3.75 L/acre
Vegetables and berries: strawberries, broccoli, Brussel sprouts, cabbage, cauliflower, carrots, rutabaga, tomatoes (transplanted), snap beans, sweetclover, saskatoon				
Bonanza EC	0.69 L/acre	0.93 L/acre	0.93 L/acre	0.93 – 1.17 L/acre
Rival EC	0.65 L/acre	0.89 L/acre	0.89 L/acre	0.89 L/acre
Treflan EC	0.69 L/acre	0.93 L/acre	0.93 L/acre	0.93 – 1.21 L/acre
Forage Legumes: Alsike clover, red clover, cicor milkvetch, bird's-foot trefoil (seed production and forage)				
Bonanza EC	0.69 L/acre	0.93 L/acre	0.93 L/acre	0.93 L/acre
Rival EC	Not registered	Not registered	Not registered	Not registered
Treflan EC	0.69 L/acre	0.93 L/acre	0.93 L/acre	0.93 L/acre

For use in canola, peas, sunflower, dry beans, mustard, fababeans, soybeans, seedling alfalfa and seedling sweet clover (spring only) and soybeans.

Products	Soil type	
	Light soils with < 5% organic matter	Medium to heavy soils with 6-15% organic matter
Advance 10G	4.45 kg/acre	5.7 – 6.9 kg/acre
Bonanza 10G	4.45 kg/acre	5.7 – 6.9 kg/acre
Rival 10G	4.45 kg/acre	5.7 – 6.9 kg/acre

For use in flax or lentils (fall only):

Products	Soil type			
	Light soils with < 5% organic matter		Medium to heavy soils with 6-15% organic matter	
	Sand – sandy loam	Loam – clay	Sand – sandy loam	Loam – clay
Field Crops: Asparagus, black beans, crambe, dry beans (field & kidney), faba beans, mustard, peas (field & canning), canola, safflower, sainfoin, sunflowers				
Advance 10G	4.45 kg/acre	4.45 – 5.6 kg/acre	5.67 kg/acre	5.67 – 6.88 kg/acre
Bonanza 10G	4.45 kg/acre	4.45 – 5.6 kg/acre	5.67 kg/acre	5.67 – 6.88 kg/acre
Rival 10G	4.45 kg/acre	4.45 – 5.6 kg/acre	5.67 kg/acre	5.67 – 6.88 kg/acre
Bonanza EC	0.93 L/acre	0.93 L/acre	1.17 L/acre	1.17 L/acre
Rival EC	0.89 L/acre	1.13 L/acre	1.21 L/acre	1.21 – 1.38 L/acre
Treflan EC	0.93 L/acre	1.21 L/acre	1.17 L/acre	1.17 L/acre

Trifluralin (cont'd)

Cereals (barley and wheat)

Fall application (between September 1 and freeze up) to stubble or summerfallow for the control of green foxtail* in Barley.

Products	Soil type					
	2 – 4% organic matter		4 – 6 % organic matter		6 – 10 % organic matter	
	Soil texture classes					
	Sandy to sandy loam	Loam to clay	Sandy to sandy loam	Loam to clay	Sandy to sandy loam	Loam to clay
Advance 10 G	3.44 kg/acre	4.45 kg/acre	4.45 kg/acre	5.67 kg/acre	NR	NR
Bonanza 10G	3.44 kg/acre	3.44 kg/acre	4.45 kg/acre	4.45 kg/acre	4.45 kg/acre	5.67 kg/acre
Rival 10 G	3.44 kg/acre	3.44 kg/acre	4.45 kg/acre	4.45 kg/acre	4.45 kg/acre	5.67 kg/acre

* Trifluralin (Advance/Bonanza/Rival) will not control trifluralin tolerant green foxtail.

Caution: For barley, do not apply Advance 10G, Bonanza 10G, Rival 10G on grey-wooded soils or other soils containing less than 2% organic matter or on black/deep black soils containing more than 6% organic matter.

Fall application (between September 1 and freeze up) to stubble or summerfallow for control of green foxtail* in Wheat

Products	All soils 2 – 8 % organic matter
Advance 10G, Bonanza 10G or Rival 10G	2.23 kg/acre

* Trifluralin (Advance/Bonanza/Rival) will not control trifluralin tolerant green foxtail.

Caution: 2.23 kg/ac is the maximum rate for wheat. Do not use higher rates for wheat as crop injury may result.

Spring application in wheat and barley for control of millet (green foxtail) – Post-plant incorporated (harrowed in after seeding)

Products	Light textured soils	Rate of herbicide tank mix partner	Adjuvant rate
Bonanza EC	0.49 L/acre	0.49 L/acre	0.70 L/acre
Rival EC	0.49 L/acre	0.57 L/acre	0.65 L/acre
Treflan	0.49 L/acre	0.49 L/acre	0.69 L/acre

Caution: Wheat or barley may be injured if seeded through a treated layer or into a deeply-incorporated layer of trifluralin.

Tank Mixes

Fertilizers: Liquid products may be mixed with liquid nitrogen fertilizer (e.g., 28-0-0) for pre-plant soil incorporated application. Before the herbicide is added to the tank, compatibility of herbicide to the liquid fertilizer should be tested following instructions on herbicide label.

Trifluralin liquids may be blended with dry bulk fertilizer. Application should be made as soon as possible after blending. With the exception of ammonium nitrates, all other commonly used dry fertilizers may be used for trifluralin liquid impregnation.

Herbicides: Spring application – Post-plant incorporated (harrowed in after seeding)

Crop	Tank mixture	Soil texture	
		Light to Medium	Heavy
Barley	Treflan or Bonanza + Extra Strength Avadex BW	Treflan or Bonanza: 0.49 L/acre Avadex BW: 1.70 L/acre	Treflan or Bonanza: 0.69 L/acre Avadex BW: 1.70 L/acre
Wheat	Treflan or Bonanza + Extra Strength Avadex BW	Treflan or Bonanza: 0.49 L/acre Avadex BW: 1.40 L/acre	Treflan or Bonanza: 0.69 L/acre Avadex BW: 1.40 L/acre

Incorporation

Summerfallow: Fall (Sept 1 – soil freeze up): Granular formulations must be incorporated at least twice with the implement operated in two different directions. The first incorporation should be in the same direction as application, within 24 hours of application. Second at the right angle to the first and should be delayed a minimum of 3 – 5 days. For best results, perform both incorporations in the fall followed by tillage (5 to 8 cm) in the spring prior to planting.

Trifluralin (cont'd)

Summer (May to July): The initial incorporation must be done within 24 hours of application. The second incorporation (and subsequent incorporations) may be done whenever necessary to destroy resistant weed growth during the remainder of the summerfallow.

Fall applied liquids: All liquid formulations must be incorporated at least twice with the implement operated in two different directions. The initial incorporation must be done within 24 hours after application. The second incorporation (and subsequent incorporations) may be done whenever necessary to destroy resistant weed growth during the remainder of the fallow season. Shallow tillage (5 to 8 cm) is necessary in the spring prior to planting.

Fall applied granules in wheat and barley – granules can be applied in the fall between September 1 and prior to soil freeze-up for the control of green foxtail in the following year. Granules should be applied to standing stubble or pre-worked stubble. The initial incorporation must be done within 24 hours of application. For best results it is recommended to do both incorporations in the fall followed by tillage (5 to 8 cm) in the spring prior to planting.

Caution: Fall application is not recommended in situations where lack of trash cover combined with required incorporation would leave the soil exposed to erosion.

Spring granules (in year of seeding) – Granular formulations: incorporate twice in cross directions using a tandem disc, tandem disc, discer or field (vibrashank type) cultivator set to work 8 to 10 cm for the first incorporation. The first incorporation should be done as soon as possible after application, but can be delayed up to 24 hours. The second incorporation can be delayed for at least 3 – 5 days following the first incorporation. This allows time for greater release of granular trifluralin onto soil particles and assures more uniform distribution in soil.

Spring liquid formulations in canola and specialty crops (in year of seeding) must be incorporated at least twice with the implement operated in two different directions. The initial incorporation must be done within 24 hours after application. The second incorporation should be a discing or cultivation in a cross direction at the same depth any time prior to planting. Shallow tillage (5 to 8 cm) is necessary in the spring prior to planting.

Spring liquid formulations in wheat and barley: Liquid formulations must be applied after seeding and shallowly (2 – 4 cm), incorporated with tye or diamond tooth harrows into trash-free soil, operating at a minimum speed of 9 km/hr. The first incorporation should be performed in the same direction of application. The second incorporation should be performed at the right angle to the first. Both incorporations should be done within 24 hrs of application.

Application Tips

Do not apply on soils that are wet, in poor tilth and contain 15% or more organic matter. Do not apply on soils with less than 2% organic matter. Application to severely eroded knolls is not recommended.

Do not apply to fields spread with manure during past 12 months. Do not apply to soils that are subjected to long-term flooding. Do not apply granular formulation on stubble in the fall for wheat when the crop harvested in the current calendar year was treated with trifluralin-based products. This includes applications made in the previous summer or fall. Seed into a firm, moist, weed-free seedbed using a double disc press drill or hoe drill set to seed 3 to 6 cm deep. If a discer or air seeder is used for seeding, separate spring tillage may not be necessary. However, care must be exercised such that the discer or air seeder is set to uniformly place the seed 3 to 6 cm deep and the seedbed should be firmly packed or harrowed after seeding to promote good germination. **Wheat:** To reduce the risk of wheat injury, use quality seed and agronomic practices, which will promote good growing conditions. Avoid deep seeding, loose seedbeds and seeding into cold soils. When seeding semi-dwarf wheat, special care should be taken to ensure shallow seeding. Apply only on trash free or summerfallow fields. **Flax and Lentils:** Shallowly till and pack the soil in the spring to ensure a firm seedbed and accurate depth of seeding. Seed into well-packed and moist seedbed. Do not seed deeper than 4 cm.

How it Works

Kills weed seedlings as they germinate. Inhibits cell division in the actively growing points of roots and shoots.

Expected Results

Most weeds die before emerging. Weeds will exhibit swelling at the coleoptile region, stubby thick primary root development and lack of secondary roots, which leads to death due to inadequate moisture absorbing ability.

Effect of Rainfall: No effect once trifluralin is incorporated into the soil.

Cropping Restrictions: Oats, sugar beets and small-seeded grasses such as timothy, canaryseed grass and creeping red fescue should not be grown in rotation following a crop treated with trifluralin based products. Do not seed wheat as a rotational crop if trifluralin and/or ethalfluralin have been used at an oilseed/special crop/barley rate for two consecutive crops. Do not direct seed (zero till) a rotational crop into standing stubble on land that has been treated with trifluralin or ethalfluralin for the previous crop.

Trifluralin (cont'd)

Grazing restrictions: Do not graze the treated crop or cut for hay; there is not sufficient data to support such use.

Environmental Hazards

Direct contamination of any body of water with trifluralin may kill fish. Do not contaminate any body of water by direct application, cleaning of equipment or disposal of wastes. Trifluralin is considered non-toxic to bees because of the nature of the formulation. Trifluralin is considered very highly toxic to aquatic organisms on an acute basis, and essentially non-toxic to birds on an acute or dietary basis. Bio-concentration potential for trifluralin is moderate. Trifluralin is absorbed by the soil and is resistant to leaching. There is little lateral movement in soil.

Toxicity

Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) – technical 10,000 mg/kg body weight.

Storage

Granular formulations must be stored in a cool, dry location, out of sunlight. Do not store Rival EC below 5°C. Do not freeze Trellan EC and Bonanza EC formulations.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.

Triton C (thifensulfuron methyl + tribenuron methyl + quinclorac)

Group 2,4

Manufacturer: E.I. duPont Canada Co.

- Formulations: Triton C:** Refine SG (soluble granules); 33.3% thifensulfuron methyl, 16.7% tribenuron methyl; 480 grams. Accord (dry flowable); 77% quinclorac (PCP# 28622); 1.08 kg. Packaged together in a 40-acre case.
 - Registered Mixes:** Axial (wild oat control), Axial + MCPA, Puma¹²⁰ Super (312 mL/ac or 156 mL/ac for green foxtail only), Horizon, Everest, Everest + 2,4-D amine, Everest + MCPA.
Surfactants: Merge 1.0% v/v when used alone. When used with graminicide, use graminicide's surfactant.
- Mixing instructions:** Add 1/2 required amount of water. While agitating, add Triton C and ensure it is completely suspended. Add graminicide if required. Complete filling, then add surfactant if required. Continuous agitation is required.

Do not use surfactant when tank mixing with Puma¹²⁰ Super.

Do not use surfactant when tank mixing with graminicide unless specified on graminicide label.

- Crops:** Feed barley, wheat (spring or durum). **DO NOT** use on Leger barley or Belvedere wheat.
- Weeds Controlled:** Triton C: 35 g/ac

annual sow thistle
ball mustard
chickweed (8.5)
cleavers
common groundsel
corn spurry (8.8)
cow cockle (8.7)

flixweed
green smartweed
hemp-nettle (8.4)
kochia (7.7)
lady's-thumb
lamb's-quarters (8.6)

narrow-leaved
hawk's-beard
redroot pigweed (8.4)
round-leaved mallow*
Russian thistle (7.9)
shepherd's-purse (8.2)
stinkweed (8.6)

stork's-bill (1 - 6 leaf)
tartary buckwheat (8.3)
volunteer rapeseed
(excluding smart-trait) (8.6)
volunteer sunflower
wild buckwheat (1 - 5 leaf)
wild mustard (8.6)

* Apply Triton C herbicide plus a surfactant to actively growing round-leaved mallow in the 2 - 6 leaf stage (10 - 12 cm in height).

Triton C (cont'd)

- 5. Weeds Suppressed:** Canada thistle (7.1), perennial sow thistle, scentless chamomile (6.9), toadflax [less than 15 cm tall (7.1)], volunteer flax.

6. When Used:

Crop stage: Triton C alone or with Puma¹²⁰ Super: Feed barley 2 - 4 leaf stage, spring wheat (including durum) 2 - 5 leaf stage.

Weed stage: Apply to young, actively growing weeds before the canopy closes. Weeds emerging after treatment may not be controlled.

Wild buckwheat: Apply Triton C + surfactant to actively growing wild buckwheat in the cotyledon to 5 leaf stage.

Cleavers: 1 - 4 whorl stage. Canada thistle, sow thistle: Apply when the majority of the thistles have emerged and are actively growing. For best top growth control, apply when thistles are no larger than 15 cm tall, before bud stage and before crop canopy prevents thorough coverage of the thistles. A single application will effectively inhibit the ability of emerged thistles to compete with the crop. Later emerging thistle will not be controlled.

Chickweed: Apply when the chickweed is small (1 - 6 leaf) and actively growing, but before crop canopy prevents thorough coverage of weeds. Chickweed emerging after application will not be controlled.

Round-leaved mallow: Apply to actively growing round-leaved mallow in the 2 - 6 leaf stage (10 - 12 cm in height). Refine Extra will keep mallow stunted, but may not reduce the overall populations.

Toadflax: Apply when toadflax is no taller than 15 cm in height. A control program for this weed includes both frequent tillage and chemical application. Volunteer rapeseed: Triton C will not control imazethypyr tolerant canola varieties (eg. smart canola).

7. How to Apply:

With: Ground equipment. Do not apply by air.

Rate: Feed barley, wheat (spring and durum), Triton C alone 39 g/ac, 40 acres/case.

Surfactant: 10 L/1,000 L of spray solution.

Water volume: 22 L/ac (minimum).

Pressure: 275 kPa.

Nozzles: Flat fan type. Use 50 mesh or larger screens. Use only metal or nylon filters.

Sprayer cleanup: To avoid injury to susceptible crops, clean sprayer thoroughly immediately after spraying. Ammonia must be used to deactivate Triton C when cleaning. Use cleaning method A on page 16.

- 8. Application Tips:** Higher spray volumes are required for dense crop canopy and/or large weeds. Weeds should be less than 10 cm tall or across at application. Effectiveness of Triton may be reduced if it remains in the tank for more than 24 hours.

Applications to wheat or feed barley that is stressed by severe weather conditions, frost, low fertility, drought, waterlogged soil (soils at or near field capacity), disease or insect damage may result in crop injury. Drought, disease or insect damage following application may also result in crop injury.

Under certain conditions (such as heavy rainfall, prolonged cool weather, frost conditions, wide fluctuations in day/night temperatures), temporary lightening in crop color and occasionally a slight reduction in crop height may occur.

- 9. How it Works:** Absorbed through foliage. Inhibits cell elongation. Causes stem elongation, leaf cupping or curling.
- 10. Expected Results:** Weeds: Growth stops immediately. Discoloration of dying weeds may not be noticeable for 1 - 3 weeks after application, depending on growing conditions and weed species. Poor results may be expected if there is improper mixing, timing, coverage or when weeds are under drought stress.
- 11. Effects of Rainfall:** Rainfall within 6 hours of application may lessen degree of weed control.
- 12. Movement in Soil:** There is little movement of Triton C in the soil.
- 13. Cropping Restrictions:** Wheat, barley, canola, field peas, flax, lentils and sunflowers can be grown 10 months after application. Oats can be grown 12 months after application. Flax and lentils may be grown the

Safety information, see page 25

Triton C (cont'd)

second year after application. On low organic matter soils or under dry conditions, flax and lentils should not be grown until three years after application. Do not use on land where potatoes or vegetables are grown. In case of crop failure, only spring wheat (including durum) may be reseeded the same year as an Triton application. For all other crops, a field bioassay should be performed before planting.

Do not apply within 77 days for spring and durum wheat or 80 days for feed barley before harvest.

Grazing restrictions: Do not graze treated crops or cut for hay within 77 days (spring wheat and durum) or 80 days (spring feed barley) of application.

14. Toxicity: Low acute mammalian toxicity. Acute oral LD_{50} (rats) = >5,000 mg/kg.

15. Precautions, First Aid: Check label for first aid information.

16. Storage: Store in a cool, dry place.

17. Resistance Management: See page 41 for information on resistance management.

Triton K (tribenuron-methyl + dicamba + 2,4D ester)

Group 2,4

Manufacturer: E.I. duPont Canada Co.

1. Formulations: Dry flowable; DB 858 – 58.54% dicamba (as sodium salt), 8.25% tribenuron methyl; 1680 gm; 2,4D ester LV 700; 9.6L.

2. Registered Mixes: Everest, Puma Super (green foxtail control only).

3. Crops: Spring wheat (incl durum), winter wheat, barley, chemfallow. Do not apply to wheat or barley underseeded to legumes or grasses.

4. Weeds Controlled: Triton K alone.

annual sunflower
ball mustard
bluebur
burdock
cocklebur
common plantain
cow cockle
daisy fleabane
dandelion (up to 15 cm rosette)

hare's-ear mustard
Indian mustard
false ragweed
flixweed
giant ragweed
kochia (incl. Group 2 res.)
lamb's-quarter
narrow-leaved
hawk's-beard

prickly lettuce
redroot pigweed
Roundup Ready canola
Russian pigweed
Russian thistle
shepherd's-purse
stinging nettle
stinkweed
sweet clover

thyme-leaved spurge
tumble mustard
volunteer canola
vetch
wild buckwheat*
wild mustard
wild radish
wormseed mustard

* 1 - 4 leaf stage.

Triton K + Everest: All above weeds controlled by Triton K alone plus wild oats and green foxtail.

5. Weeds Suppressed: Canada thistle (top growth control).

6. When Used:

Crop stage: 3 to 5 leaf stage.

Weed stage: Must be actively growing and less than 15 cm tall or across.

7. How To Apply:

With: Ground equipment. Do not apply by air.

Rate: DB 858: 37 g/ac; 2,4-D Ester: 257 mL/ac of LV 700.

Surfactant:

Water volume: 22 L/ac - 44 L/ac.

Pressure: 210 - 275 kPa.

Nozzles: Use flat fan nozzles. Do not use flood jet nozzles. Use 50 mesh or larger screens.

Safety information, see page 25

Triton K (cont'd)

Mixing Instructions: Use mixing procedure "b" on page 12.

Sprayer cleanup: To avoid injury to susceptible crops, clean sprayer thoroughly immediately after spraying. Ammonia must be used to deactivate the product when cleaning the equipment. Use cleanup method A on page 16.

- 8. Application Tips:** Effectiveness may be reduced if spray mixture remains in the tank for more than 24 hours.
- 9. How it Works:** Absorbed through foliage and roots. Inhibits cell elongation.
- 10. Expected Results:** Triton K stops growth of susceptible weeds immediately. However, typical symptoms (discolouration) of dying weeds may not be noticeable for 1 - 3 weeks after application, depending on growing conditions and weed susceptibility.
- 11. Effects of Rainfall:** If rainfall occurs within 4 hours after application, control may be reduced.
- 12. Movement in Soil:** Triton K has little movement in the soil. It has a very short soil life.
- 13. Cropping Restrictions:** A minimal interval of 4 months is required before seeding the following: alfalfa, canola, flax or lentils. Any crop can be seeded the following year.
- 14. Toxicity:** Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) = >5,000 mg/kg. May irritate eye, nose and skin.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Store in a cool, dry place.
- 17. Resistance Management:** See page 41 for information on resistance management.

Trophy (fluroxypyr + MCPA ester)

Group 4

Manufacturer: Nufarm Agriculture Inc.

- 1. Formulations: Trophy A:** 180 g/L fluroxypyr EC (PCP# 27246); 4.8 L jug.
Trophy B: 500 g/L MCPA Ester EC (PCP# 27245); 9 L jug.
- 2. Registered Mixes:** Achieve Liquid (200 mL/ac) + Turbocharge (spring wheat and barley); Assert (540 mL/ac for wild oats 1 - 3 leaf stage, 670 mL/ac for wild oats at 4 leaf stage) (spring wheat and barley); Horizon (115 mL/ac) + Score adjuvant (spring wheat); Puma¹²⁰ Super (312 mL/ac) (spring wheat and barley).
- 3. Crops:** Barley, canary seed, spring wheat (including durum).
- 4. Weeds Controlled:**

annual sunflower	flixweed	mustard	stinkweed
cleavers (1 - 4 whorl)	hemp-nettle (2 - 6 leaf)	(except dog, green tansy)	vetch
cocklebur	kochia	prickly lettuce	volunteer canola
common burdock	lamb's-quarters	redroot pigweed (1 - 4 leaf)	volunteer flax (1 - 12 cm)
common ragweed		shepherd's-purse	wild radish
- 5. Weeds Suppressed:** Green smartweed, stork's-bill (1 - 8 leaf), wild buckwheat (1 - 4 leaf).
- 6. When Used:**

Crop stage: Barley, spring wheat: 3 leaf to early flag. Canary seed: 3 leaf to before flag leaf emerges.

Weed stage: 2 - 4 leaf stage.
- 7. How to Apply:**

With: ground equipment only. With sprayer that can apply 45 L/ac spray solution because lower water volume may cause mixing problems and/or unacceptable crop injury may occur.

Safety information, see page 25

Trophy (cont'd)

Rate:

Trophy A: 240 mL/ac.

Trophy B: 450 mL/ac.

Water volume: 45 L/ac.

Pressure: 135-270 kPa.

Nozzles: Flat fan type. Use 50 mesh or larger screens.

Mixing instructions: Only use in sprayers with good agitation. Ensure sprayer is properly cleaned prior to applying Trophy.

1. Fill the sprayer with 1/2 the required amount of water, start agitation and continue agitation throughout the mixing and spraying procedure.
2. Add required number of jugs of Starane, then MCPA Ester.
3. Complete filling the sprayer tank.

8. Application Tips: Trophy activity is influenced by weather conditions. Optimum activity requires active weed growth. Temperature range for optimum activity is 12°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost before application (3 days) or shortly after (3 days) may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions, e.g. heat, drought or cold, or if weeds have initiated flowering or if heavy infestations exist. Wet foliage at time of application may result in reduced weed control. Optimum timing of application is 2 - 4 leaf stage of weeds. Application on cleavers can be made up to 6 whorl (20 cm height) stage. Do not apply to wheat and barley underseeded to legumes. Make only one application per year. Application prior to 3 leaf stage of wheat and barley may cause severe twisting of leaves and leaf stem and head deformities, which may reduce yield. Do not apply later than flag leaf stage of crop.

9. How it Works: Trophy herbicide tank mix is non-residual. The components of Trophy tank mix move within the plant to control exposed and underground plant tissue. It mimics naturally occurring plant hormones and controls weeds by disrupting normal plant growth patterns. Symptoms include twisting of stems and swollen nodes.

10. Expected Results:

Broadleaf weeds: Weeds start to twist shortly after spraying. After twisting and bending, plants stop growing, turn brown and die.

11. Effects of Rainfall: Do not apply if rain is expected in 1 hour.

12. Movement in Soil: MCPA and fluroxypyr bind lightly to soil organic matter but do not bind readily to sand, silt or clay. Due to their relatively short half life, they rarely move deeper than 15 cm into the soil.

13. Cropping Restrictions:

Succeeding crops: Fields previously treated with Trophy herbicide tank mix can be seeded the following year to wheat, barley, oats, rye forage grasses, flax, lentils, peas, canola and mustard, or fields can be summerfallowed. Do not seed crops other than those listed above for at least one year following treatment.

Drift: Broadleaf crops are sensitive to spray drift. Minimize drift by using nozzles that put out sufficient spray volume and large droplets.

Grazing restrictions: Allow 7 days between application and grazing.

Other restrictions: Do not harvest the treated mature crop within 60 days after application.

14. Toxicity: MCPA has moderate acute mammalian toxicity. Acute oral LD₅₀ (rats) = technical 700 - 880 mg/kg. Fluroxypyr has very low mammalian toxicity. Acute oral LD₅₀ = >2,000 mg/kg.

15. Precautions, First Aid: Check label for first aid information.

16. Storage: Store in a dry heated area. If product is frozen, bring to room temperature and agitate before use.

17. Resistance Management: See page 41 for information on resistance management.

Tropotox Plus/Clovitox Plus/ Topside (MCPB + MCPA)

Group 4

Manufacturer: Nufarm Agriculture/Interprovincial Co-operatives/United Agri Products Canada Inc.



Caution Poison

1. Formulations: Water soluble solution; 375 g/L MCPB + 25 g/L MCPA; 10 L container. Tropotox plus (PCP# 8211). Clovitox Plus (PCP# 24336). Topside (PCP# 22003).

2. Registered Mixes: None.

3. Crops:

alfalfa (seedling, grown for seed)	clover seedlings	oats	spring wheat (8.9)
alsike clover	fall rye	pasture	white Dutch clover
(seedlings) (7.2)	field corn	peas (7.2)	(seedlings)
barley (8.8)	Ladino clover	red clover	wild white clover
	(seedlings)	(seedlings)	(seedlings)

Underseeding: Clover can be used on barley, oats, wheat companion crops.

Seedling grasses

altai fescue	intermediate wheatgrass	red canary grass	tall fescue
altai wild rye	meadow brome grass	Russian wild rye	tall wheatgrass
creeping red fescue	meadow fescue	slender wheatgrass	timothy
crested wheatgrass	northern wheatgrass	smooth brome grass	western wheatgrass
green needlegrass	pubescent wheatgrass	streambank wheatgrass	

4. Weeds Controlled:

ball mustard (7.9)	lamb's-quarters (8.1)	redroot pigweed (7.4)	wild mustard (7.9)
bull thistle	plantains	shepherd's-purse (5.0)	wormseed mustard (7.9)
curled dock	ragweed	stinkweed (7.5)	volunteer rapeseed

5. Weeds Suppressed:

annual sow thistle (5.4)	field bindweed (3.2)	horsetail	tall buttercup
Canada thistle	hemp-nettle (5.9)	perennial sow thistle	wild radish
creeping buttercup			

6. When Used:

Crop stage: Barley, fall rye, oats, spring wheat: 2 leaf to flag leaf stage. Clover: 1 - 4 true leaf stage. Corn: After 45 cm high but before tasseling begins, with drop nozzles. Peas: 3 - 6 expanded leaves or 2 - 5 nodes. (Important: damage may be caused, particularly in early maturing varieties, if spraying is carried out after this stage). Seedling alfalfa: 3 - 6 trifoliate. Seedling grasses: 2 - 4 leaf stage. Pasture: After grazing or cutting.

Weed stage: Annual weeds: Seedling stage. Bull thistle: Rosette to early bud stage.

Bindweed, buttercups: in spring, when growth is vigorous. Canada thistle: 15 cm to early bud stage. Curled dock, perennial sow thistle, plantains: young plants in rosette stage. Horsetail: when 15 cm tall.

7. How to Apply:

With: Ground equipment.

Rate: 1.1 - 1.7 L/ac depending on weeds to be controlled.

Seedling grasses: 1.1 - 1.4 L/ac.

Water volume: 60 - 80 L/ac.

Pressure: 275 kPa.

Nozzles: Flat fan recommended.

Safety information, see page 25

Tropotox Plus/Clovitox Plus/Topside (cont'd)

- 8. Application Tips:** Spray in warm weather when plants are actively growing. Peas: Spray when growing conditions are good and the peas are not under stress from drought or disease. Seedling alfalfa: Alfalfa vigour may be reduced in the year of treatment; however, the crop recovers and yield will not be affected.
- 9. How it Works:** A systemic, absorbed by leaves and stems and translocated to actively growing regions. It disrupts cell division, stops cell growth and interferes with respiration and food reserves. Selectivity based on ability of plant to efficiently convert MCPB to MCPA.
- 10. Expected Results:**
Broadleaf weeds: Should be dead within 2 - 3 weeks of treatment. **Poor results and/or crop injury may be expected if** water volume is incorrect or weeds are too mature.
- 11. Effects of Rainfall:** Rainfall before the foliage has dried from the spraying may decrease activity.
- 12. Movement in Soil:** Readily leached from soil. Longer residual in dry soil.
- 13. Cropping Restrictions: Grazing restrictions:** Do not graze the treated crop or cut for forage until 30 days after treatment. Do not graze the seedling grasses or cut for hay in the year of establishment.
- 14. Toxicity:** High acute mammalian toxicity. Acute oral LD₅₀ (rats) = 500 mg/kg. Non-toxic to bees. Intake can cause convulsions and coma. Can cause burns to the skin and eyes.
- 15. Precautions, First Aid:** Check label for first aid information.
- 16. Storage:** Store in heated area.
- 17. Resistance Management:** See page 41 for information on resistance management.



Warning Poison

Tundra

Manufacturer: Bayer CropScience Inc.

Herbicide Group 1,6,27

Formulations

Product	Company	Active Ingredient	Formulation	Container size
Infinity (PCP# 28738)	Bayer CropScience Inc.	Pyrasulfotole 15.5 g/L	EC	1L to bulk
Puma Super (PCP# 25864)	Bayer CropScience Inc.	Fenoxaprop-P-ethyl 46 g/L	EC	
Pardner (PCP# 18001)	Bayer CropScience Inc.	Bromoxynil 87.5 g/L	EC	

Crops and Staging

Crop	Staging (Zadoks Growth Stage)
Spring and durum wheat, spring barley	1 - 6 leaves on main stem plus 3 tillers

Note: Do not apply to crops undersown with legume species.

Weeds Controlled

Weed stage: Grassy weeds: 1 - 6 leaves, up to emergence of 3rd tiller. **Broadleaf weeds:** 1 - 6 leaf stage unless otherwise noted.

Rates: 809 mL/ac

annual sow thistle
 barnyard grass
 Canada thistle (up to 30 cm
 high-suppression only)
 chickweed
 cleavers¹

Dandelion (suppression only)²
 flixweed²
 green foxtail
 hemp nettle
 kochia²
 lamb's-quarter

pale smartweed
 perennial sow thistle (suppression)
 pigweed
 redroot
 shepherd's-purse
 stinkweed

Russian thistle¹
 volunteer canola (all types)
 wild buckwheat
 wild mustard
 wild oats
 yellow foxtail

Note: ¹ 1-6 whorl stage. At 4 - 6 whorl stage, add ammonium sulphate at 202 g/ac (99%) or .404 L/ac (49% solution).

² Up to 10 cm in height.

Tundra (cont'd)**Tank Mixes:** None**Application Information****Water volume:** Ground: minimum 19 L/ac, Aerial: Minimum 11.4 L/ac.**Nozzle and pressure:** Use 80° or 110° flat fan nozzles to maximize coverage at 275 kPa pressure.**Application Tips**

Use higher water volumes under conditions of heavy crop or weed canopies. For best results, apply to emerged, young, actively growing weeds. **Apply only once per season.** Under cool and/or dry conditions activity may be reduced or delayed. Weed control may also be reduced if application is made when weeds are dust covered or in the presence of heavy dew, fog or mist/rain. If crop is under stress due to abnormal environmental conditions, delay application until stress passes and after both crop and weeds have resumed active growth.

How it Works

Tundra is composed of 3 main herbicides. Puma Super, Infinity and Pardner. Puma Super works by contact as well as systemically. It is active in areas of high meristematic activity, like the roots and shoots. Infinity also is systemic, moving to areas of high meristematic activity where it block the HPPD enzyme, inhibiting plant pigment biosynthesis and photosynthesis. Pardner is a contact herbicide, inhibiting respiration and photosynthesis.

Expected Results: Typical symptoms include broadleaf weeds turning brown and dying within 3 – 5 days, reduced grassy leaf growth and chlorotic blotching within 3 days of application followed by leaf chlorosis and complete death by 2- 3 weeks and leaf bleaching.

Effect of Rainfall: Rainfall within 1 hour of application may reduce effectiveness.

Restrictions

Re-cropping: The following crops can be grown 10 months after application: alfalfa, barley, canaryseed, canola, flax, field peas, oats and wheat (spring and durum). Lentils can be grown 22 months after application. A field bioassay must be conducted the year prior to growing any other crop of interest to confirm crop safety.

Grazing: Minimum of 25 days after application for use as grazing or cut for forage.

Pre-harvest Intervals: Must wait a minimum of 65 days after application, prior to grain harvest.

Environmental Hazards

Toxic to aquatic organisms and non-target terrestrial plants. Use of a hand-held or backpack sprayer, inter-row hooded sprayer, spot treatment, soil drench, and soil incorporation. Does not require a buffer zone.

Runoff: To reduce runoff from treated areas into aquatic habitats avoid application to areas with a moderate to steep slope, compacted soil, or clay. Avoid application when heavy rain is forecast. Do not apply, drain, or flush spray equipment on or near desirable trees or other plants or on areas where their roots may extend, or in locations where the chemical may be washed or moved into contact with their roots.

Toxicity

Pyrasulfotole (Infinity) is practically non-toxic to mammals, birds, fish and aquatic invertebrates, bees, earthworms and is toxic to aquatic plants and non-target terrestrial plants. Bromoxynil (Pardner) is moderate, acutely toxic to mammals, very toxic to fish and can be absorbed through the skin. Fenoxaprop-p-ethyl (Puma Super) has an acute oral LD₅₀ (rats) of 3,735 mg/kg.

Storage

Store the tightly closed container away from feeds, seeds, fertilizers, plants and foodstuffs. Cannot be stored below freezing. If stored for one year or longer, shake or mix well before using. Do not use or store in or around the home.

Precautions, First Aid: Check label for first aid information.

Resistance Management: See page 41 for information on resistance management.

Unity (bromoxynil + triasulfuron)

Group 6,2

Manufacturer: Bayer CropScience Inc.



Warning Poison

Herbicides

1. **Formulations:** **Unity 280EC:** Emulsifiable concentrate; 280 g/L bromoxynil (PCP# 24497); 2 x 4 L jug.
Unity 75WG: Water dispersible granule; 75% triasulfuron (PCP# 24596); 4 x 43 g.

2. **Registered Mixes:** MCPA Ester (wheat and barley), 2,4-D Ester (wheat and barley), Lontrel (wheat and barley), Puma¹⁰⁰ Super (spring wheat).

Surfactants: Always use a surfactant with this tank mix application. Use a recommended non-ionic surfactant such as Agral 90, Ag-Surf, Citowett Plus, Super Spreader-Sticker, or Companion when applying Unity post-emergent at 0.25% v/v (2.5 L per 1,000 L spray mixture).

3. **Crops:** Barley, durum wheat, spring wheat.

4. **Weeds Controlled:**

chickweed
cleavers
cow cockle
flixweed

green smartweed
hemp-nettle
kochia
lady's-thumb

lamb's-quarters
redroot pigweed
shepherd's-purse
stinkweed

volunteer canola
wild buckwheat
wild mustard

5. **Weeds Suppressed:** None.

6. **When Used:**

Crop stage: Barley, wheat: 2 leaf stage just prior to flag leaf.

Weed stage: 2 - 4 leaf stage (2 pairs of true leaves).

7. **How to Apply:**

With: Ground equipment. **Do not** apply by air.

Rate: Unity 75WG at 4.3 g/ac plus Unity 280EC at 200 mL/ac.

Surfactant: 0.25% v/v (2.5 L per 1,000 L of spray mixture).

Water volume: 40 L/ac.

Pressure: 275 kPa.

Nozzles: Flat fan with 50 mesh screens or larger.

Mixing instructions: Use mixing procedure "b" on page 12.

Sprayer cleanup: To avoid subsequent injury to crops other than cereals, thoroughly clean application equipment immediately after spraying. Ensure that all traces of the product are removed. Use cleanup method A on page 16.

8. **Application Tips:** Adequate control may not be achieved under unfavorable conditions such as drought, flooding, prolonged temperature extremes or insufficient fertility.

9. **How it Works:** Absorbed through the leaves of emerged weeds and is rapidly translocated to the weed's growing points.

10. **Expected Results: Weeds:** Visual symptoms (discolouration) take 1 - 3 weeks to appear, depending on the weed species and growing conditions. Death of weeds usually takes 3 - 4 weeks after application.

11. **Effects of Rainfall:** **Do not** apply if rain is expected within 2 hours of spraying.

12. **Movement in Soil:** Degradation of Unity 75WG in the soil is affected by rainfall, soil temperature and soil pH. The breakdown process is more rapid with soil conditions of high moisture, high temperature and low pH.

13. **Cropping Restrictions:** To avoid injury to subsequent crops after an application of recommended rates of Unity, the following recropping intervals should be observed.

Safety information, see page 25

Unity (cont'd)

Grazing restrictions: Do not use treated cereals for grazing of livestock or green feed until 30 days after application.

Recropping Guidelines for Post-emergent Use

Crop	Soil pH 6.4 or less	Minimal interval (months)	
		Soil pH 6.5 - 7.4	Soil pH greater than 7.5
Barley, durum wheat, oats	10	10	10
Canary seed	22	22	22
Canola	10	22	34
Flax	10	10	22

continued

continued

Recropping Guidelines for Post-emergent Use

Crop	Soil pH 6.4 or less	Minimal interval (months)	
		Soil pH 6.5 - 7.4	Soil pH greater than 7.5
Lentils, sunflowers, all other crops	Bioassay	Bioassay	Bioassay
Mustard	22	22	34
Peas	10	22	22
Spring wheat (hard red, Canada Prairie extra strong)	No restrictions	No restrictions	No restrictions

14. Toxicity: Unity is a package mixture of bromoxynil and triasulfuron. Bromoxynil has moderate acute mammalian toxicity. Acute oral LD₅₀ (rats) = 440 mg/kg. Triasulfuron has low acute mammalian toxicity. Acute oral LD₅₀ (rats) = >5,000 mg/kg.

15. Precautions, First Aid: Check label for first aid information.

16. Storage:

Unity 280EC will solidify at temperatures below -20°C but will become useable again at temperatures above 0°C. **Shake well before using.**

Unity 75WG: Store above freezing. Prolonged storage at temperatures below 0°C may cause the soluble bag to become brittle.

17. Resistance Management: See page 41 for information on resistance management.

UpBeet (triflusulfuron methyl)

Manufacturer: E.I. duPont Canada Co.

Group 2



Caution Poison

1. Formulations: Dry flowable; 50% (PCP# 25813); 117 g container.

2. Registered Mixes: Betamix.

Surfactants: Agral 90, Ag-Surf, Citowett Plus, Sure-Mix.

Mixing instructions: Use mixing procedure "b" on page 12.

Note: Continuous agitation is required to keep UpBeet in suspension. To avoid product degradation, apply UpBeet spray mixture within 24 hours of preparation. When using tank mix partners, follow the most restrictive label.

3. Crops: Sugar beet.

Safety information, see page 25

4. Weeds Controlled:

UpBeet + adjuvant: velvetleaf.

UpBeet + Betamix: lamb's-quarters, kochia (rosette stage), redroot pigweed, velvetleaf.

5. Weeds Suppressed: UpBeet + Betamix: green foxtail.**6. When Used:**

Crop stage: Sugar beets: apply any time after planting and after weeds have emerged.

Weed stage: Apply when kochia is less than 2.5 cm in diameter and when tank mix with Betamix is preceded by a pre-plant or pre-emergence treatment. If velvetleaf is the predominant weed, 2 applications of UpBeet + adjuvant is preferable to a tank mix of UpBeet and Betamix because of the possibility of antagonism.

7. How to Apply:

With: Ground equipment only. Do not apply by air. Do not apply through any type of irrigation equipment.

Rate:

UpBeet: 14 - 28 g/ac plus surfactant 2.5 liters per 1,000 liters of spray solution.

UpBeet + Betamix: 14 - 28 g/ac UpBeet plus 700 - 1,400 mL/ac Betamix (do not use an adjuvant when tank mixing Betamix with UpBeet).

Make two sequential applications. The total grams of product applied must not exceed 40 g/ac per growing season.

Water volume: Minimum of 40 L/ac.

Pressure: 210 - 275 kPa.

Nozzles: Use flat fan nozzles. Use 50 mesh screens or larger.

Sprayer cleanup: It is important that spray equipment is cleaned and free of existing pesticide deposits before using UpBeet herbicide. To avoid subsequent injury to desirable crops, thoroughly remove all traces of UpBeet Herbicide from all mixing and spray equipment immediately after spraying and prior to spraying other crops. Use cleaning method A on page 16.

- 8. Application Tips:** Applications should be made 5 - 10 days apart or as weeds germinate. Weeds should be actively growing and not under stress. For best results, apply to small, emerged weeds between the cotyledon and 4 true leaf stage at approximately 5 cm tall or across. Applications made to larger weeds or to weeds under stress may result in unsatisfactory control. Since UpBeet has little or no soil activity, only weeds that have emerged above the soil surface will be controlled. Use sequential tank mix applications to control new weed flushes. Timely cultivation(s) can be used in addition to UpBeet tank mixes for optimum weed control in a sugar beet management program. Dry, dusty field conditions may reduce weed control in wheel track areas. Higher water volumes may improve control in these conditions.

- 9. How it Works:** Absorbed through foliage. Inhibits cell elongation.

- 10. Expected Results:** UpBeet herbicide rapidly stops the growth of susceptible weeds; weeds turn yellow usually 7 - 21 days after post-emergent application, followed by the death of the growing plant. Warm, moist growing conditions before, during and immediately after application promote the activity of UpBeet, while cool and/or dry conditions may reduce or delay herbicidal activity. Large weeds or weeds stressed due to frost, drought or water-saturated soil, disease or insect damage may not be controlled adequately.

- 11. Effects of Rainfall:** Rainfall within 6 hours may reduce weed control.

- 12. Movement in Soil:** Movement is restricted by finely textured soils, soil organic matter and neutral to acidic conditions. The product is relatively immobile in most agricultural soils.

- 13. Cropping Restrictions:** Do not harvest within 60 days of treatment.

In case of crop failure, only sugar beets may be replanted 30 days after application of UpBeet. However, if a total of 100 g/ha of UpBeet has already been applied to the first crop of sugar beets, then no more UpBeet may be applied to the second crop of sugar beets. Cereal crops (spring wheat, durum wheat, winter wheat,

UpBeet (cont'd)

barley) may be planted the following year after application of UpBeet. For all other crops, a field bioassay must be conducted. A successful field bioassay means growing to maturity a test strip of the crop(s) intended for production the following year.

14. **Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) > 5,000 mg/kg.
15. **Precautions, First Aid:** Check label for first aid information.
16. **Storage:** Store in a cool, dry place, but not below 5°C.
17. **Resistance Management:** See page 41 for information on resistance management.

Vanquish *(dicamba)*

Group 4

Manufacturer: Syngenta Crop Protection Canada Inc.



Warning Poison

1. **Formulations:** Liquid; 480 g/L (PCP# 26980); 10 L jug.
2. **Registered Mixes:** 2,4-D (Amine, LV Ester); 2,4-D + dichlorprop (Desormone LV 700, Diphenoprop BK700, Turboprop 600).

Roundup and Roundup + 2,4-D: For roadside vegetation control.

Mixing restrictions: Do not mix with oils. Use aerial tank mixes only on aspen poplar and white birch.

3. **Crops:** Non-crop areas such as established turf, railways, roadsides and utility rights-of-way.
4. **Weeds Controlled:**

0.50 L/ac Vanquish (turf)

clover	erect knotweed	mouse-eared chickweed	sheep sorrel
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0.95 L/ac Vanquish

Canada thistle	false ragweeds	giant ragweeds	perennial sow thistle
common ragweeds	field bindweed	goldenrod	tansy ragwort
English daisy			

1.90 L/ac Vanquish

diffuse knapweed	ground cherry	poverty weed	thyme-leaved spurge
goat's-beard	pasture sage	sheep sorrel	

3.7 L/ac Vanquish

baby's-breath	fringed sage brush	lambkill	velvet grass
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0.85 L/ac Vanquish + 1.8 L/ac 2,4-D Amine 500

wild carrot

Brush: Rates/1,000 L of water.

Group 1: 2.1 L Vanquish + (4.0 L 2,4-D Amine or 3.3 L 2,4-D Ester 600)

alder	cherry	wild rose
aspen poplar	western snowberry	wolf willow

Group 2: 4.0 L Vanquish + (8.0 L 2,4-D Amine or 6.6 L 2,4-D Ester 600)

balsam fir	black cottonwood	hickory	spruce	white cedar
balsam poplar	bur oak	pine	tamarack	
birch	elm	red oak	vine maple	

Group 3: 5.2 L Vanquish + 7.1 L (2,4-D + dichlorprop)

sugar maple	white ash
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5. Weeds Suppressed: Top growth control.**0.50 L/ac Vanquish**absinthe
Canada thistleleafy spurge
perennial sow thistlepoverty weed
scentless chamomile**0.95 L/ac Vanquish**

curled dock

3.7 L/ac Vanquish

bracken fern

perennial cinquefoil

Russian knapweed

6. When Used:

Coniferous and deciduous species: When leaves are fully expanded (spring-early summer), and stop applications at least 3 weeks prior to a change of leaf colour in the fall.

Roadside vegetation control: Vanquish can be used in a tank mix with Roundup for annual vegetation control on 1 - 2 metre wide roadside shoulders. Vanquish tank mixes with Roundup and 2,4-D offer a broader spectrum of total control of roadside vegetation.

Weed stage: Broadleaf weeds: When actively growing, normally between May and July.

7. How to Apply:

With: Aircraft or ground equipment. Thorough coverage essential.

Rate: See *Weeds Controlled*, *Weeds Suppressed*. Rates vary depending on species.

Roadside vegetation control:

1. 0.5 - 1.06 L/ac Vanquish + 0.3 - 0.4 L/ac Roundup.
2. 0.12 L/ac Vanquish + 0.49 L/ac 2,4-D (500 g/L) + 0.3 - 0.4 L/ac Roundup.

Water volume: Aircraft: 35 L/ac minimum. Ground: Turf weeds: 45 L/ac; Weeds: 45 - 90 L/ac; Brush: rate/1,000 L of water.

Nozzles: Flat fan recommended.

- 8. Application Tips:** Thorough coverage of weed and wetting brush to the point of runoff is essential for control. Brush and trees over 2 m should be cut and regrowth sprayed. Do not use on bentgrass. Do not rake, mow or water turf within 24 hours after treatment. 2,4-D Ester tank mix may improve brush control, especially under drought stress. Tank mix with 2,4-D (Amine or Ester) for control of a broader range of weeds. Avoid spraying if temperatures exceed 30°C, to reduce risk of vapour drift. Avoid spraying onto soil over root system of desirable trees and shrubs. Thoroughly clean application equipment after use.
- 9. How it Works:** Dicamba is a systemic herbicide absorbed through roots or leaves and translocated in most plants. Disrupts the metabolic and growth activities in the plant.

- 10. Expected Results:** Excellent control of brush can be expected within a year of application. Effect on broadleaf weeds may be seen in 10 - 14 days with twisting and bending of main stem, cupping of leaves, increase in root size and increase in fibrous roots.

- 11. Effects of Rainfall:** Rainfall 4 hours after application will not reduce effectiveness.

- 12. Movement in Soil:** Dicamba is more subject to leaching in sandy soils than in clay textured soils. During the growing season, the half-life of dicamba is less than 30 days.

- 13. Cropping Restrictions:** Use on non-crop areas such as roadsides, utility rights-of-way, railways, wasteland and similar areas.

- 14. Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = 3,512 mg/kg. Acute dermal LD₅₀ (rats) = >2,000 mg/kg. Low toxicity to fish. Non-toxic to bees. May cause severe damage to eyes.

- 15. Precautions, First Aid:** Check label for first aid information.

- 16. Storage:** Freezing may cause crystalization but no activity is lost if completely resuspended.

- 17. Resistance Management:** See page 41 for information on resistance management.

Vantage Plus MAX II is under Glyphosate.

Velocity m3 *(thiencarbazone-methyl + pyrasulfotole + bromoxynil)*

Group 2, 6, 27

Manufacturer: Bayer CropScience

- Formulations:** **Velocity A:** Oil dispersion; 10 g/L thiencarbazone-methyl (PCP# 29070) 1 x 4.0 L jug.
Velocity B: Emulsifiable concentrate; 37.5 g/L pyrasulfotole/210 g/L bromoxynil (PCP# 28738) 1 x 6.7 L jug.
- Registered Mixes:** None.
- Crops:** Spring wheat, durum wheat.
- Weeds Controlled:** **Grassy weeds*:** Barnyard grass, green foxtail, wild oats.

Broadleaf weeds**

annual sow thistle	hemp-nettle	redroot pigweed	volunteer canola****
chickweed	kochia**	Russian thistle	wild buckwheat
cleavers***	lamb's-quarters	shepherd's-purse	wild mustard
flixweed	pale smartweed	stinkweed	

* Includes ACCase (Group 1) resistant biotypes.

** Includes ALS (Group 2) resistant biotypes.

*** Includes indoleacetic acid (Group 4) resistant biotypes.

**** Includes all types of volunteer canola, including herbicide tolerant.

- Weeds Suppressed:** **Grassy weeds:** Persian dandel, yellow foxtail. **Broadleaf weeds:** Canada thistle, dandelion*, perennial sow thistle, round leaf mallow.
* Includes seedlings and overwintered rosettes.
- When Used:** **Crop stage:** Spring and durum wheat: 1 - 6 leaf on main stem plus 3 tillers (prior to presence of first node or jointing).

Grassy weed stage:

Weeds controlled from the 1 - 6 leaf plus 3 tiller stage: Wild oat, barnyard grass, green foxtail.

Weeds suppressed from the 1 - 6 leaf plus 3 tiller stage: Persian dandel, yellow foxtail.

Broadleaf weed stage:

Weeds controlled from the 1 - 6 leaf or whorl stage: Annual sow thistle, chickweed, cleavers, hemp-nettle, lamb's-quarters, pale smartweed, redroot pigweed, shepherd's purse, stinkweed, volunteer canola, wild buckwheat and wild mustard.

Flixweed and Russian thistle: Up to 10 cm in height.

Canada thistle suppression: Up to 30 cm in height.

Dandelion suppression: Up to 10 cm in height or 25 cm in diameter.

Perennial sow thistle and round leaf mallow suppression: 1 - 6 leaf.

7. How to Apply:**With:** Aircraft or ground equipment.**Rate:** Velocity A: 0.2 L/ac; Velocity B: 0.335 L/ac.**Water volume:** Air: minimum of 11.3 L/ac. Ground: minimum of 18.9 L/ac.**Pressure:** Air: Not less than 300 kPa. Ground: 207 - 345 kPa.**Nozzles:** Flat fan nozzles of 80° or 110° are recommended for optimum coverage. Do not use floodjet or controlled droplet application equipment or Sprafol equipment. Uniform, thorough coverage is important to obtain consistent weed control. Higher water volumes should be used under dense crop and weed canopies to ensure thorough coverage of the target weeds.

Mixing instructions: Velocity m3 herbicide must be applied with properly calibrated and clean sprayer equipment. Velocity m3 herbicide is specially formulated to mix readily in water. Prior to adding Velocity m3 herbicide to the spray tank, ensure that the spray tank is thoroughly clean. Use mixing procedure "b" on page 12.

Sprayer cleanup: Use cleanup method A on page 16.

- 8. Application Tips:** Apply only once per season with ground or aerial equipment. Do not use Velocity m3 herbicide if another Group 2 grass herbicide has been previously applied in the same season. For best results, apply to emerged, young, actively growing weeds. Velocity m3 herbicide will have an effect on weeds that are larger than the recommended leaf stage; however, the speed of activity and level of control may be reduced. Under cool and/or dry conditions, activity may be reduced or delayed. If weeds are under stress due to abnormal environmental conditions, delay application until stress passes and after weeds have resumed active growth. Weed control may also be reduced if application is made when weeds are dust covered or in the presence of heavy dew, fog or mist/rain. Do not apply to crop that is under stress due to abnormal environmental conditions such as frost, extreme heat, low fertility, drought, flooding or disease and/or insect damage as crop injury may result.

9. How it Works:

Velocity A: Thien carbazon-methyl: Uptake is primarily via foliage and is transported to areas on new shoot growth where it inhibits the enzyme acetolactate synthase (ALS). Inhibition of this enzyme prevents protein production, which leads to gradual death of target weeds.

Velocity B: Pyrasulfotole: Absorbed through leaves and is translocated to meristematic regions where it inhibits the HPPD enzyme. Pyrasulfotole inhibits plant pigment biosynthesis and photosynthesis. Bromoxynil: Works on contact, interfering with photosynthesis, disrupting plant growth, which ultimately leads to the plant's death.

- 10. Expected Results: Broadleaf weeds:** Small burnt spots on leaf can appear in hours. Lack of plant pigments shuts down the photosynthetic pathway resulting in bleaching symptoms and rapid death, normally in 6 - 14 days.

Grass weeds: Growth of susceptible plants stops rapidly, and after a few days plants develop chlorotic discoloration on the leaves, which sometimes turn red. Complete control may take two to four weeks.

- 11. Effects of Rainfall:** Rainfall within 60 minutes of application may reduce effectiveness.

- 12. Movement in Soil:** Short half-life and rapid degradation offset potential for lateral or downward movement in soil.

13. Cropping Restrictions:

Succeeding crops: The following crops can be planted 10 months after application: alfalfa, barley, corn, canary seed, canola, flax (including low linolenic acid varieties), field peas, oats, spring and durum wheat, soybeans. The following crops can be planted 22 months after application: lentils.

Grazing restrictions: Do not graze the treated crop or cut for forage or hay within 25 days after application. Do not harvest wheat for grain or straw within 60 days of application.

- 14. Toxicity: Velocity A:** Has no acute toxicity and very low chronic toxicity to mammals, birds, fish, aquatic invertebrates, honeybees and earthworms. Terrestrial and aquatic non-target plants show expected herbicide sensitivity.

Velocity B: Is practically non-toxic to wild mammals, birds, fish, aquatic invertebrates, honeybees and earthworms. Velocity B is toxic to terrestrial and aquatic non-target plants.

- 15. Precautions, First Aid:** Check label for first aid information.

- 16. Storage:** Store in a cool, dry place. Do not store below freezing. Shake well before using.

- 17. Resistance Management:** See page 41 for information on resistance management.

Viper (imazamox + bentazon + UAN)

Group 2,6

Manufacturer: BASF Canada

1. **Formulations: Solo:** Water dispersible granule; 70% imazamox (PCP# 25496); 4 x 117 g water soluble bags. **Basagran Forte:** Solution; 480 g/L bentazon (PCP# 22006); 2 x 7.23 L. BASF 28% UAN (28-0-0); 2 x (2 x 8 L).
Note: BASF 28% UAN is required and sold separately.
2. **Registered Mixes:** None.
3. **Crops:** Field peas.
4. **Weeds Controlled:**
Grasses: Barnyard grass, green foxtail, Persian darnel, volunteer barley, volunteer canary seed, volunteer oat, volunteer wheat (not CLEARFIELD varieties), wild oat, yellow foxtail.
Broadleaf weeds: Cow cockle, green smartweed, lamb's-quarters, redroot pigweed, shepherd's-purse, stinkweed, volunteer canola (including CLEARFIELD varieties), wild mustard (including Group 2 resistant biotypes).
5. **Weeds Suppressed:** Japanese brome, cleavers, kochia (including Group 2 resistant biotypes), wild buckwheat.
6. **When Used:**
Crop stage: Field peas: Apply at the 3 - 6 above-ground nodes (3 - 6 true leaves).
 Temporary crop yellowing may be observed shortly after application in field peas.
Weed stage: Grasses: 1 - 4 main stem leaves or until early tillering. Broadleaf weeds: Apply from cotyledon to 4 leaf stage.
7. **How to Apply:**
With: Ground equipment only.
Rate: Solo: 11.7 g/ac. Basagran Forte: 0.36 L/ac. BASF 28 % UAN: 0.81 L/ac. BASF 28% UAN (sold separately) **must** be used with Viper at 0.81 L/ac. **Note:** Merge adjuvant is **not** required for use with Viper.
Water volume: 40 L/ac.
Pressure: 275 kPa.
Nozzles: 50 mesh screens (or coarser).
8. **Application Tips:** Water soluble bags will dissolve better when kept intact; do not split bags. If agitation is stopped for more than 5 minutes, re-suspend spray solution by full agitation prior to commencing spraying again. Do not spray if temperatures of +5°C or lower are forecasted within 3 days of application. Temperatures near freezing (below 5°C) will prevent optimum herbicide performance, as weeds are not actively growing. To optimize herbicide performance, apply in warm weather (15 - 28°C optimum temperature) to actively growing weeds. Initial transient crop yellowing may be observed after application, but this is outgrown and should not affect yield. Apply Viper when broadleaf weeds are small and actively growing and before weeds reach the maximum size recommended for control.
 Failure to include UAN will result in significantly reduced product performance.
9. **How it Works:** Imazamox is a systemic herbicide absorbed by foliage and roots that disrupts plant metabolism causing growth to stop. Bentazon is a contact herbicide taken up primarily through the leaves and interferes with photosynthesis. Thorough coverage of foliage is important for consistent weed control.
10. **Expected Results:**
11. **Effects of Rainfall:** Do not spray if there is a forecast of rain during or soon after application as the rain may reduce control. Rainfall within 6 hours of application may reduce activity.

Safety information, see page 25

12. Movement in Soil: No soil movement. This product will not leach in the soil.

13. Cropping Restrictions:

Grazing: Do not graze treated field peas or cut for feed within 20 days of application.

Pre-harvest interval: Do not apply within 60 days of harvest.

Re-cropping: Canary seed, Clearfield canola, non-Clearfield canola, chickpea, field corn, field pea, flax, lentil, oat, barley and spring wheat (including durum), tame oats and sunflowers may be seeded the first spring after application and tame mustard the second season after application. The company recommends that a field bioassay (a test strip grown to maturity) be conducted the year before growing any crops other than those listed above.

Contact manufacturer for additional information on recropping intervals (1-877-371-2273).

Do not apply Viper more than once per year.

14. Toxicity: Imazamox: Low acute mammalian toxicity. Acute oral LD₅₀ (rats) 5,000 mg/kg, non-toxic to fish. Bentazon: Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = technical 1,100 mg/kg, slightly toxic to fish. Both products are non-toxic to birds and bees.

15. Precautions, First Aid: Check label for first aid information.

16. Storage: Do not freeze. Store in a cool, dry place above 5°C.

17. Resistance Management: See page 41 for information on resistance management.

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Safety information, see page 25

Chemical Insect Control in Alberta

The degree of infestation and the severity of insect damage vary drastically from area to area and season to season. Most pests, such as grasshoppers, cutworms and Bertha armyworms, require control during periods of abundance that may last from one to several years. Other pests, like flea beetles, require control annually in some parts of Alberta.

To ensure proper use of insecticides, identify the pest, learn its biology, check your fields and do not panic when you see an insect in your crop. Obtain information on pending pest problems and keep in mind the previous years' problems, so you are prepared for changes in insect population levels.

Chemical control

Attention to the following points should lead to more effective control once a decision to apply an insecticide is made. Insecticides will kill the pest insect if applied properly at a stage when the pest is susceptible. An application made too early or too late in the life cycle may not provide adequate control and would be wasteful. Follow label instructions for proper application. Consider factors like penetration through foliage, weather conditions, age and size of the insect, wait period to grazing or harvest and dosage required when making an application decision. If insects are moving into crops or emerging over an extended period, several applications in the same season may be necessary since most insecticides have limited residual properties when applied to foliage.

Safety

In general, insecticides are more toxic to humans, wildlife, fish, bees and other non-target organisms than herbicides or fungicides. Follow label directions for safety precautions associated with application of each insecticide. Refer to the introductory section of this book for general information on pesticide toxicity, exposure, safety precautions, protective equipment, symptoms, first aid, Poison Control Centres and disposal. Specific information on safety is included with each insecticide.

Bee safety

The insecticides used to protect crops from damaging outbreaks of insect pests can also kill some beneficial insects. The problem facing the applicator is one of how to remove the problem insects from the crop with the least possible impact to beneficial insects such as honeybees, leafcutter bees and other insects. Because bees play such an important role in pollinating some crops, neither beekeepers nor producers want to see them harmed. Although it may not be possible to totally eliminate the impact of insecticides on beneficial insects, their impact can be greatly reduced when agricultural producer, pesticide applicator and the beekeeper work together.

Beekeepers should:

- Talk with the landowners near their bee yards before spray season and provide the producers with their phone number.
- Ask producers if spraying to control insects is likely this year.
- Request the producer to provide them with notification 48 hours in advance of applying an insecticide.

Producers and applicators should:

- Check for potential insect infestations in field crops early and frequently, and determine what the economic thresholds are for problem insects so that a spray program can be planned should it be required.
- Notify beekeepers of intentions to spray 48 hours in advance of spraying.
- Avoid application of insecticides to crops in bloom or to fields containing blooming weeds, which are attractive to foraging bees. Where feasible, use a preventative program early in the season when insecticides may be as effective and crops are not blooming.
- Spray late in the day or early in the morning when the temperature is below ideal foraging temperatures to reduce direct exposure to bees. Honeybees are most active when the temperature is above 18°C (72°F), usually in the heat of the day. As a general rule, evening applications are less hazardous than morning applications.

- Where there is a risk to bees, use an insecticide that has short residual activity to reduce the impact on the bees and to reduce possibilities of residues occurring in honey and pollen.
- Learn about pollination requirements of the different crops grown and about honeybees and leafcutter bees.

Caution

Unusually low temperatures during and immediately following applications cause insecticides to remain toxic to bees for a much longer period than normal. High temperatures will extend the foraging period, and application time must be adjusted accordingly. Prevent insecticides from drifting into adjacent blooming crops, roadsides and pastures with weeds in bloom, water used by bees, leafcutter shelters or apiaries by maintaining a reasonable distance from field boundaries and allowing for the potential movement of insecticides by wind. For more information, contact the Alberta Ag-Info Centre at 310-farm (3276).

Rights and good practice

By law, persons, provided they do not contravene any land use by-laws, regulations or generally accepted practices, may operate an agricultural operation (including the application of pesticides). It's important to follow label directions and good practices regarding protection of pollinator species from insecticide applications.

Laws generally allow persons to obtain a benefit on their property, provided that the benefit is not achieved at the expense of adjacent landowners. Ensure that pesticides are used in a manner where drift does not occur.

Notification ensures that hazards are identified prior to spraying so that farmers or their custom applicators can adjust application practices to prevent problems, and beekeepers can adjust practices to accommodate spraying. Notification does not mean seeking permission to spray. Producers have the legal right to apply pesticides on their property.

Toxicity of Pesticides to Honeybees

Highly toxic

Severe losses may be expected if the following materials are used when bees are present at treatment time or within a few days thereafter:

Actara
Admire
Alias 240 SC
Assail 70 WP
Ambush 500EC
Citadel 480EC
Clutch
Cygon 480
Decis 5EC
Furadan 480F
Grapple
Imidan 50 WP
Lorsban 4E
Malathion 25W
Matador 120EC
Nufos 4E
Pounce
Pyrinex 480EC
Ripcord 400EC
Sevin XLR Plus
Silencer 120EC

Moderately toxic

These can be used around bees if dosage, timing, and method of application are correct, but do not apply them directly on bees, in the field or at the colonies:

Endosulfan 50W
Lannate
Thiodan
Thionex EC

Non-toxic

These are relatively non-toxic to honeybees:

Bravo 500
Captan
Coragen
Dithane DG

Gavel 75 DF
Kumulus DF

Manzate 200 DF
Manzate 200 WP
Movento 240 SC
Penncozeb 75DF
Polyram DF
Ridomil Gold 480 EC
Ridomil Gold MZ
Ronilan EG
Rovral
Senator 70WP

Notification is a two-way street – both the beekeeper and farmer have to make efforts to protect pollinators.

Note: In many cases, beekeepers cannot move or cover their bees, especially during honey flow, so timing and accuracy of an insecticide application, plus selection of the safest insecticide where there is risk to bees, are the only ways to safeguard bees.

Livestock and residues

The number of days between the application of an insecticide and harvesting, feeding to livestock or grazing is given on the label. These restrictions must be followed to prevent illegal residues in crops and livestock and to eliminate hazards to consumers.

The guide

This guide only includes the major insecticides registered for use on field crops in Alberta. Not all insects controlled are listed for each insecticide.

Economic threshold

Before making a decision to apply an insecticide, producers need to know if the application would be economically justified. In addition to the expected dollar value of the crop, the producer needs to determine whether the insects present will cause a yield loss greater in value than the cost of control. The economic thresholds listed below will assist in making this decision.

Thresholds are given as the number of insects/unit of measure (such as #/plant or #/m²) or, for insects that are difficult to sample, the amount of damage evident. Chemical controls are generally only warranted when numbers meet or exceed the threshold level. Remember to sample throughout the field (minimum of 10 samples per 160 acres) to obtain an average infestation level.

Economic Thresholds for Insect Pests of Forage and Special Crops

Insect	Economic threshold	Comments
Alfalfa weevil	Alfalfa hay crops: Apply controls when 25 - 50% of leaves on upper one-third of stem show damage or when 50 - 70% of terminals show injury. Alfalfa seed crops: 20 - 25 larvae per 90° sweep or when 35 - 50% of foliage tips show damage.	Alfalfa hay crops: 20 - 30 larvae per sweep cause a 12% leaf loss; 50 - 75 larvae per sweep cause a 30% leaf loss; 56 larvae per stem will return treatment costs.
Aphids	Canary grass: 50 per head between heading and soft dough.	
Beet leafminer	Sugar beet: Only infestations causing more than 25% defoliation require treatment.	
Grasshoppers	Alfalfa: See Cereals and Corn table. Safflower: 15/m.	
Pea aphid	Alfalfa: 75 - 100 aphids per plant. Field peas: 1 - 4 aphids per 20 cm stem tip when 50 - 75% of plants have begun to flower.	
Plant bugs	Alfalfa seed: 5 nymphs per sweep (any or all species of plant bugs) when alfalfa is in bud or bloom.	
Red clover thrips	Red clover seed fields: 50 - 80 thrips per raceme.	Threshold levels have occurred only during years of early spring drought on dryland.
Sweetclover weevil	Seedling crop (cotyledon stage): 1 weevil per 5 seedlings under slow growing conditions or 1 weevil per 3 seedlings under normal growing conditions. Newly emerged 2nd-year sweetclover: 9 - 12 weevils per plant.	

Economic Thresholds for Insect Pests of Cereals and Corn Crops

Insect	Economic threshold	Comments
Aphids		Do not treat for aphids in cereals after the soft dough stage. Aphid populations decrease rapidly as heads mature.
Birdcherry-oat	Seedling: 20: Boot: 30 (aphids per stem)	Birdcherry-oat aphid and greenbug vector barley yellow dwarf virus. Greenbug injects a toxin that stunts plants.
Corn leaf	Seedling: 20: Boot: 30 (aphids per stem)	
English grain	Seedling: 30: Boot: 50 (aphids per stem)	
Greenbug	Seedling: 5 - 15: Boot: 10 - 25 (aphids per stem)	
Russian wheat	Spring cereals - Seedling: 10 - 15%; Boot: 15 - 20% (% plants infested) Winter cereals - Seedling: 15 - 20% after October 1st	
Armyworm	11/m ²	
Barley thrips	Mean of 7.5 thrips per stem based on a sample size of 50 stems, chemical control = \$5.75/ac and market value = \$1.90/bushel	Infestations of one thrip per stem have caused losses of 0.4 - 1.25 bushels/ac.
Cutworms		8.4 PWC larvae/m ² caused 25% loss in wheat; 30 PWC larvae/m ² caused 100% yield loss. PWC and RBC : well established crops with good moisture can tolerate higher numbers.
Pale western	3 - 4/m ²	
Red-backed	5 - 6/m ² moisture	
European corn borer	Dryland grain corn: when 50% of plants show leaf feeding	
Grain stink bug	Wheat: 1 per head caused losses greater than 30%	
Grasshoppers	13/m ² in fields or 25/m ² in roadsides	
Hessian fly	None available	Several larvae per plant may kill barley and wheat.
Orange wheat blossom midge	1 adult seen per every 4 - 5 heads of wheat	Infestations of 30, 60 and 90% reduced spring wheat yields by 40, 65 and 80% respectively in Saskatchewan.
Wheat stem sawfly	None available	Plant resistant varieties if 10 - 15% of the previous crop was cut by sawfly. Infested stems of wheat averaged 17% yield loss.

Economic Thresholds for Insect Pests of Oilseed Crops

Insect	Economic threshold	Comments
Aphids	Canola: rarely a problem. Flax: 8 - 10 aphids per stem at green boll stage.	Aphids on the top 10 - 15 cm of canola plants near the end of flowering do not cause yield losses.
Army cutworm	Seedling mustard: less than 5/m ² .	
Bertha armyworm	20 larvae/m ² consume 65 kg Argentine canola seed/ha.	Economic threshold for Polish canola types is likely 25% less than for Argentine.
Diamondback moth	200 - 300 larvae/m ² in canola; if leaves are on plants, feeding on pods is limited.	Threshold may be lower for Polish than for Argentine type canolas. Timing of the infestation also influences the threshold.
Flea beetles	50% leaf tissue consumed; less if growing and moisture conditions are poor.	Damage is usually most severe along field margins and frequently only field margins require treatment.
Lygus bug	Canola: 1.5 and 2.0 lygus bugs per sweep at the end of bloom and early pod development, respectively (crop stage 4.4 and 5.1). Threshold during pod ripening (crop stage 5.2) appears to be greater than 3 per sweep.	A threshold for the bud stage has not been determined. Experience in 1998 indicates that heavy adult numbers can cause severe bud blast under dry, hot conditions. At least 10 sets of 15 sweeps, each taken anywhere in a field, are necessary to have an accurate assessment of Lygus numbers. Controls should not be required within 10 days of swathing.
Sunflower beetle	1 adult per 2 - 3 seedlings or over 10 larvae per plant.	Severe leaf damage may occur to plants in the 2 - 6 leaf stage when adults are numerous, or at any time when larvae are numerous.
Sunflower maggots	None established	
Sunflower midge	Losses are more severe around field edges; estimate losses by sampling heads and classifying them on the degree of head distortion.	
Sunflower seed weevils (grey & red)	Confectionery sunflower: 1 adult per head. Oil sunflower: 10 - 12 seed weevil adults per head.	(R - 5.1 stage). Re-infestation may occur with a high weevil population. Re-check fields when 80 - 100% of heads are at the R - 5.5 stage. Apply treatment at early anthesis when 30 - 70% of sunflower heads are in early pollen formation.

Insecticide Group Classification by Mode of Action

Mode of action	Chemical family	Active ingredients	Found in
Group 1A, 1B			
Acetylcholinesterase inhibitors. These chemicals inhibit an enzyme, interrupting the transmission of nerve impulses.	Carbamates (Group 1A)	carbaryl	ECO Bran, Sevin XLR
		carbofuran	Furadan
		methomyl	Lannate
	Organophosphates (Group 1B)	acephate	Orthene 75%
		chlorpyrifos	Citadel 480 EC, Lorsban 4E, Nufos 4E, Pyrinex 480 EC
		diazinon	Agrox B-2*, Agrox CD*, DCT*, Diazinon
		dimethoate	Cygon 480, Cygon 480 EC, Cygon Hopper Stopper, Dimethoate Plus, Lagon 480E
		malathion	Malathion
		methamidophos	Monitor
		naled	Dibrom
		phorate	Thimet
		phosmet	Imidan 50-WP Instapak
		terbufos	Counter
Group 2A			
These chemicals interfere with GABA receptors of insect neurons, leading to repetitive nervous damage.	Chlorinated cyclodienes	endosulfan	Thiodan, Thionex EC
Group 3			
These chemicals act as a axonic poison by interfering with the nervous system, leading to paralysis.	Synthetic pyrethroids	cyhalothrin-lambda	Matador 120EC, Silencer 120EC
		cypermethrin	Ripcord
		deltamethrin	Decis
		permethrin	Pounce, Ambush 500EC
Group 4			
These chemicals binds to nicotinic acetylcholine receptor, disrupting nerve transmission.	Chloronicotines	acetamiprid	Assail 70 WP
		clothianidin	Poncho, Prosper*, Prosper FX*, Titan ST, Clutch
		imidacloprid	Admire, Alias 240 SC, Gaucho 480*, Gaucho CS FL*, Genesis, Grapple
		thiomethoxam	Actara, Helix*, Helix XTra*

(continued)

Insecticide Group Classification by Mode of Action

Mode of action	Chemical family	Active ingredients	Found in
Group 8B			
Unknown	Fumigant	aluminum phosphide	Phostoxin
Group 15			
These chemicals act as insect growth regulators. They disrupt chitin synthesis.	Insect growth regulator	novaluron	Rimon
Group 23			
Lipid biosynthesis inhibitor.	Tetramic acid	spirotetramat	Movento
Group 28			
Acts on the ryanodine receptor of the insect muscle cell, leading to muscle paralysis.	Diamide	chlorantraniliprole	Coragen

* Contains insecticide and fungicide combination.

Actara *(thiomethoxam)*

Group 4

Manufacturer: Syngenta Crop Protection Canada Inc.

1. Formulations:

Actara 240SC: Soluble concentrate; 240 g/L (PCP# 28407); 0.453 - 3.78 L.

Actara 25WG: Water dispersable granules; 25% (PCP# 28408); 0.45 - 3.4 L.

2. Registered Mixes:

Actara 240SC: Quadris, Ridomil Gold.

Actara 25WG: None.

Mixing instructions:

1. Add 1/2 of the required amount of water to the tank mix.
2. With the agitator running, add the desired amount of Actara 240SC or Actara 25WG insecticide to the tank.
3. Continue agitation while adding remainder of the water.
4. Begin application of the solution after Actara 240SC or Actara 25WG have completely dispersed into the mix water.
5. Maintain agitation until all the mixture has been applied.

3. Crops: Potato.

4. Insects Controlled: Colorado potato beetle, aphids, potato leafhopper.

5. When Used:

Actara 25WG: Apply before pests reach damaging levels.

Actara 240SC:

Soil application: For best results, direct spray on the seed pieces or seed potatoes in the furrow. The higher rate is recommended when extended length of control is needed.

One in-furrow soil application of Actara 240HC is allowable per growing season. **Do not** use a foliar application Actara 25WG insecticide following in-furrow or soil applications of Actara 240SC insecticide, which also contains thiamethoxan.

6. How to Apply:

Actara 25WG:

With: Can be applied by aerial or ground application.

Rate: 43 g/ac.

Water volume: Ground: 40 L/ac, Air: 8 - 20 L/ac. Use sufficient water for thorough coverage.

Actara 240SC:

With: Ground equipment only. Do not apply by air.

Rate:

Soil application: 3.4 - 4.4 mL per 100 metre row or 151 mL to 196 mL per acre based on 90 centimetre row spacing. Use the higher rate for extended control.

7. Application Tips: **Actara 25WG:** Do not exceed a total of 86 g of Actara 25WG during a growing season. Allow at least 7 days between applications. This product is highly toxic to bees exposed to direct treatment or to residues on blooming crops' weeds. Do not apply Actara 25WG or allow it to drift onto blooming plants if bees are visiting the treated area. After an Actara 25WG application, wait at least 5 days before placing the beehives in the treated field.

Soil application: Apply once as an in-furrow spray with sufficient water to ensure good coverage.

8. How it Works: Actara is a systemic neonicotinoid class of chemistry.

Safety information, see page 25

- 9. Grazing, Cropping and Other Restrictions:** Do not apply directly to any freshwater habitat. Avoid drifting of spray onto any body of water or other non-target areas. See label for specified buffer zones. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.
- Rainfastness:** Actara 25WG: Rainfast once spray has dried.
- Pre-harvest interval:** Actara 25WG: 7 days.
- Re-cropping:** Actara 240SC: Treated areas may be replanted immediately following harvest with any crop listed on the label or to sorghum, wheat, barley or canola. All other crops require a 120 day plant-back interval.
- 10. Toxicity:** Oral LD₅₀ (rats) >5,000 mg/kg. Dermal LD₅₀ (rabbits) = >2,000 mg/kg.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store in cool, dry place and in such a manner as to prevent cross contamination with other pesticides, fertilizers, food and feed. Store in original container and out of reach of children.
- 13. Resistance Management:** See page 41 for information on resistance management.

Admire/Alias 240 SC/ Grapple (imidacloprid)

Group 4

Manufacturer: Bayer CropScience Inc./MANA Canada/Cheminova Canada



Caution Poison

- 1. Formulations:** Flowable; 240 g/L; 1 L, 3.785 L. Admire (PCP# 24094). Alias 240 SC (PCP# 28475). Grapple (PCP# 28726).
- 2. Registered Mixes:** None.
- Mixing instructions:** To prepare the spray, add a portion of the required amount of water to the spray tank and, with agitation, add Admire Flowable/Alias 240 SC. Complete filling the tank with the balance of water needed. Maintain sufficient agitation during both mixing and application.
- 3. Crops:** Potatoes.
- 4. Insects Controlled:** Foliar application: Buckthorn aphid, Colorado potato beetle, foxglove aphid, green peach aphid, potato aphid, potato flea beetle.
- Soil application: Buckthorn aphid, Colorado potato beetle, foxglove aphid, green peach aphid, potato aphid, potato flea beetle, potato leaf hopper.
- Potato seed piece application: Buckthorn aphid, Colorado potato beetle, foxglove aphid, green peach aphid, potato aphid, potato flea beetle, potato leaf hopper.
- 5. When Used:**
- Foliar application:** A maximum of two foliar applications of Admire/Alias/Grapple may be made per season.
- Soil application:** For best results, direct spray on the seed pieces or seed potatoes in the furrow. The higher rate is recommended when extended length of control is needed.
- One, in-furrow soil application of Admire/Alias/Grapple where high Colorado potato beetle populations are expected is allowable; foliar applications of Admire/Alias/Grapple cannot be applied in fields where in-furrow treatment has been used earlier in the same season. Up to a maximum of 2 foliar applications of Admire 240/Alias 240 can be applied where field population monitoring indicates the need and precise timing for treatment.

Admire/Alias 240 SC/Grapple (cont'd)

Potato seed treatment: Apply specified dosage as a diluted spray onto seed pieces using a shielded spray system that is well contained and will prevent any liquid loss. Agitate or stir solution as needed. For optimal insect control, good coverage of seed piece is required. Length of insect control increases with increased insecticide rate.

6. How to Apply:

With: Ground equipment only. Do not apply by air.

Rate:

Soil application: 7.5 - 12 mL per 100 meter row or 345 mL to 525 mL per acre based on 90 meter row.

Foliar application: 80 mL/ac.

Potato seed piece application: 26 - 39 mL /100 kg seed. Do not dilute with more than 3 parts water to 1 part Admire/Alias/Grapple. Do not apply more than 0.47 L/ac per year. Select an effective treatment rate based upon seeding rate and desired duration of control. The lower rate of 26 mL may be used for seeding rates up to 3,990 lbs/ac. The higher rate of 39 mL/100 kg seed can not be used for seeding rates higher than 2,655 lbs/ac.

Water volume: Water volume should be adequate to provide sufficient coverage.

7. Application Tips:

Soil application: For best results during soil application, direct spray on the seed pieces or seed potatoes in the furrow.

Seed piece application: As part of the seed cutting and treating process, application of a fungicide registered for potato seed treatment or an inert absorbent ingredient is recommended immediately after applying liquid Admire/Alias/Grapple.

8. How it Works: Admire/Alias/Grapple are systemic chloronicotinyl insecticides.**9. Grazing, Cropping and Other Restrictions:** Do not apply to within 15 metres of wellheads or aquatic systems, including marshes, ponds, ditches, streams, lakes, etc. Do not apply to terrain where there is a potential for surface runoff to enter aquatic systems. Do not apply when rainfall is forecast for the next 48 hours. Do not mix, load or clean spray equipment within 30 metres of wellheads or aquatic systems. Do not apply this product through any type of irrigation system. **Do not re-enter** treated areas for 24 hours after foliar application of Admire/Alias/Grapple.

Potato seed piece use: Treated areas may be replanted to any crop specified on an imidacloprid label, or any crop for which a tolerance exists for the active ingredient, as soon as practical.

Minimum plant back interval: Wheat, barley, oats - 30 days. Peas, beans (including fababeans, soybeans, adzuki beans, mung beans, lima beans, scarlet runners, dry common beans, snap common beans) - 9 months. Green manure or cover crops not intended for animal or human consumption do not require a plant back interval. Do not graze or harvest such crops. Rotation to all other food and feed crops will require a 12 month plant back interval be observed. It is not recommended that this product be used in fields treated with imidacloprid products during the previous season. This product is toxic to wildlife. Keep out of lakes, streams, ponds or other aquatic systems. Do not contaminate water when disposing of equipment wash waters. Apply this product only in accordance with the label directions. Dispose of all excess and any spilled treated seed pieces by covering or incorporating into the soil. Leftover treated seed should be double sown around the headland or buried away from water sources such as lakes, streams, ponds or aquatic systems.

10. Toxicity: Acute oral toxicity LD₅₀ (rats) = 4,143 - 4,870 mg/kg. Dermal toxicity LD₅₀ (rabbits) = 200 mg/kg.**11. Precautions, First Aid:** Check label for first aid information.**12. Storage:** Store in cool, dry place and in such a manner as to prevent cross contamination with other pesticides, fertilizers, food and feed. Store in original container and out of reach of children.**13. Resistance Management:** See page 41 for information on resistance management.

Safety information, see page 25

Assail 70 WP (acetamiprid)

Group 4

Manufacturer: E.I. duPont Canada Co.

1. Formulations: Wettable powder; 70% (PCP# 27128); 340 g jug.

2. Registered Mixes: None.

Mixing instructions:

1. Fill tank 1/4 full with the required amount of total spray volume of water.
2. Add Assail brand 70 WP insecticide at recommended rates for the pest and crop type and begin agitation.
3. Continue to fill tank while directing stream of water onto any floating Assail 70 WP insecticide.
4. Allow to mix in tank for 2 minutes or until thoroughly mixed before applying.

3. Crops: Cole (Brassica), leafy vegetables, potato.

4. Insects Controlled: Aphids, Colorado potato beetle, pea leafminer (35 g/ac), swede midge, whitefly.

5. When Used: Begin application when insect populations reach recognized economic threshold levels. Consult the provincial extension service, professional consultants or other qualified authorities to determine appropriate threshold levels for treatment in your area.

6. How to Apply:

With: Ground equipment. Aerial application for potatoes only.

Rate: Use the high rate under heavy insect pressure or dense foliage. Thorough and uniform spray coverage of the plants is important to obtain optimum control. Use at 22 - 35 g/ac for aphid control and 16 - 32 g/ac for Colorado potato beetle, both on potatoes. Use higher rates when the majority of Colorado potato beetle population is in the adult stage and for heavy pest pressure.

Crop	Insect	(g/ac)
Cole crops	Aphids	23 - 35
	Swede midge	35
	Whitefly	49
Leafy vegetables	Aphids	23 - 35
Potato	Aphids	23 - 35
	Colorado potato beetle	16 - 32

Water volume: Ground: Apply in a minimum finished spray volume of 80 L/ac. Air: 19 L/ac.

Pressure: 275 kPa (40 psi).

Nozzles: Use hollow cone or flat fan nozzles.

Sprayer cleanup: To clean the sprayer after use, drain and flush with water. Use rinsings on crop according to label instructions or dispose of in an approved manner.

7. Application Tips: Assail 70 WP can be effectively utilized in integrated pest management programs. It has been shown to leave substantial populations of many beneficial insects and spiders after use. The lower rates allow for maximum beneficial survival and faster rebound of beneficial populations.

For best results, it is important to obtain thorough and uniform spray coverage of the plant. Use the high rates for heavy infestations or dense foliage. The specific length of residual control depends on environmental factors, plant growth, dosage rate and degree of insect infestation.

Do not make more than 5 applications per season. **Do not** apply more than once every 7 days.

Do not exceed a total of 174 g product per acre per season. **Do not** re-enter treated area within 12 hours.

Effects of rainfall: Assail 70 WP is rainfast within 6 hours of application.

Safety information, see page 25

Assail 70 WP (cont'd)

8. How it Works: Assail 70 WP is absorbed into plant tissue and translocated to protect tender new shoots, passing through leaves to provide underside coverage. Assail works on insect pests through both contact and ingestion.

9. Grazing, Cropping and Other Restrictions: Do not apply less than 7 days before harvest. Observe a 7-day pre-harvest interval.

A buffer zone of 20 metres for application by ground-boom sprayer should be established between the last spray swath and the edge of aquatic systems such as rivers, lakes, ponds, streams and other bodies of water. A buffer zone of 2 metres is required between the last spray swath and the edge of terrestrial habitats such as hedgerows, windbreaks, woodlots, vegetative strips and other vegetation.

Cropping restrictions: There are no rotational crop plant restrictions for this product.

10. Toxicity: Moderate acute mammalian toxicity. Acute oral LD₅₀ (rats) = 1,064 mg/kg. Acetamiprid is toxic to honeybees exposed to direct treatment. Do not apply when bees are present in the areas to be treated.

11. Precautions, First Aid: Check label for first aid information.

12. Storage: Do not store in or around the home. Store unused product in a cool, ventilated, dry, locked area. Do not allow prolonged storage in areas where temperatures frequently exceed 46°C (115°F). Never transfer this product to another container for storage.

13. Resistance Management: See page 41 for information on resistance management.

Coragen (chlorantraniliprole)

Group 28

Manufacturer: E.I. duPont Canada Co.

1. Formulations: Suspension; 200g/L (PCP# 28982); 0.5 L, 3.79 L, 100 L.

2. Registered Mixes: None.

3. Crops*: Potatoes.

* See label for complete list of registered crops.

4. Insects Controlled: Colorado potato beetle, European corn borer.

5. When Used: Begin application when insect populations reach recognized economic threshold levels. Consult the provincial extension service, professional consultants or other qualified authorities to determine appropriate threshold levels for treatment in your area.

6. How to Apply:

With: Ground equipment. Aerial application for potatoes only.

Mixing instructions:

1. Fill tank 1/4 - 1/2 full with the required amount of total spray volume of water.
2. Add Coragen insecticide at recommended rates for the pest and crop type directly to spray tank and begin agitation.
3. Mix thoroughly to fully disperse the insecticide and continue agitation once dispersed.
4. Do not leave spray mix stored overnight in spray tank.

Rate: Potato: 100 - 150 mL/ac.

Water volume: Ground: 40 L/ac. Air: 20 L/ac.

Sprayer cleanup: Following application, immediately clean spray equipment to avoid formation of hardened deposits. Dispose of rinse water in an approved manner.

Safety information, see page 25

7. Application Tips*: Potatoes:

- Use the high rates for heavy pest infestations.
- Do not make more than 4 applications per season.
- Do not apply more than once every 5 days.
- Do not exceed a total of 455 mL of product per acre per season.
- Do not re-enter treated area within 12 hours.

Effects of rainfall: Avoid application when heavy rainfall is forecast.

* For all other crops, refer to label.

- 8. How it Works:** Coragen moves into leaf tissue where it is available to chewing insects feeding on leaf surfaces. Feeding on leaf tissues results in paralysis and death.
- 9. Grazing, Cropping and Other Restrictions:** For potatoes, do not apply less than 14 days before harvest. Observe a 14-day preharvest interval. For all other crops, refer to label.
A buffer zone of 1 metre for application by ground-boom sprayer should be established for the protection of freshwater habitats. For aerial applications, a buffer zone of 1 metre should be established for the protection of freshwater habitats with depths greater than 1 metre. For freshwater habitats with depths of less than 1 metre, a buffer zone of 15 metres is required for aerial applications.
- 10. Toxicity:** Oral LD₅₀ (rats) = >5,000 mg/kg. Dermal LD₅₀ (rats) = >5,000 mg/kg.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Do not store in or around the home. Store unused product in a cool, ventilated, dry, locked area. Store product in original container only. Never transfer this product to another container for storage.
- 13. Resistance Management:** See page 41 for information on resistance management.

Counter (terbufos)

Group 1B



Danger Poison

Manufacturer: AMVAC Corporation

- 1. Formulations: Counter 15G:** Granular; 15% (PCP# 15268); 20 kg lock and load.
- 2. Registered Mixes:** None.
- 3. Crops: 15G:** Sugar beets.
- 4. Insects Controlled: 15G:** Sugar beet root maggot, wireworms.
- 5. When Used:** Sugar beets: At planting time.
- 6. How to Apply:**

With: Ground equipment. May be applied with airseeders.

Rate:

Crop	Insect	Formulation	kg/ac
Sugar beet	Sugar beet root maggot, wireworms	15G	45 g/100 m row (minimum 50 cm row spacing)

Incorporation: Apply in furrow, 5 - 8 cm behind the seed drop zone after some soil has covered the seed. Do not place 15G granules in direct contact with seed.

- 7. Application Tips:** When a seed treatment is also used – mix the seed treatment with seed, then mix granules with treated seed. Empty hoppers of equipment while still in the field. Cover granules that may be exposed on the ends of the treated rows, turns and field loading or cleaning areas.

Safety information, see page 25

Counter (cont'd)

- 8. How it Works:** Counter is a systemic, organophosphorus insecticide with effective initial and residual activity.
Effects of rainfall: The effect of normal rainfall is not appreciable.
Movement in soil: Insoluble in water, therefore, movement is not appreciable.
- 9. Grazing, Cropping and Other Restrictions:** Treated sugar beet tops and beet pulp may be fed to livestock after harvest.
- 10. Toxicity:** High acute mammalian toxicity. Acute oral LD_{50} (rats) = technical 1.6 mg/kg. Highly toxic to fish, birds and other wildlife. Rapidly absorbed through skin. Repeated inhalation or skin contact may, without symptoms, progressively increase susceptibility to poisoning.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store open bags in labelled, sealed drums or heavy plastic bags.

Cruiser Maxx Cereals

(thiamethoxam + difenoconazole + metalaxyl-M)

Group 4 (Insecticide) Group 3,4 (Fungicide)

Manufacturer: Syngenta Crop Protection Canada Inc.

- 1. Formulations:** 2.80% thiamethoxam; 3.36% difenoconazole + 0.56% metalaxyl-M (PCP# 29127); 26 L, 115 L tote.
- 2. Registered Mixes:** None.
- 3. Crops:** Barley, spring wheat, winter wheat.
- 4. Diseases Controlled:** Common and dwarf bunt, general seed rots, seedling blight, root rot, and damping off caused by seed and soil-borne *Fusarium* and soil-borne *Pythium*, covered and false loose smut, loose smut.
- Insects suppressed:** Wireworms.
- Fungi suppressed:** Common root rot (*Cochliobolus* spp.), take-all, *Fusarium* crown and foot rot.
- 5. When Used:** Treat seed prior to or at seeding.
- 6. How to Apply:**
With: Cruiser Maxx Cereals can be applied on-farm at the low rate through a certified application course. See label for protective equipment when treating or handling treated seed. For more information on higher application rates or very high wireworm populations call 1-800-SYNGENTA.
Rate: 325 mL / 100 kg seed.
- 7. Application Tips:** Uniform coverage is important to obtain optimum results in the field.
- 8. How it Works:** Cruiser Maxx Cereals is a combination of an insecticide and fungicides that controls or suppresses certain insect pests and seed- and soil-borne diseases of cereal crops.
- 9. Grazing and Other Restrictions:** Do not graze or feed livestock on seeded area within 45 days of planting.
 All bags containing treated seed for sale or use in Canada must be labelled or tagged as follows: "This seed has been treated with the insecticide, thiamethoxam, and difenoconazole and metalaxyl-M (and S-isomer) fungicides. Wear long-sleeve shirt, long pants, and chemical-resistant gloves when handling treated seed. Do not graze or feed livestock on seeded area for 45 days after planting. Do not use for food, feed or oil processing. Store away from food and feed. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned-up from the soil surface."
- 10. Toxicity:** Acute oral LD_{50} (rats) > 5,000 mg/kg. Acute dermal LD_{50} (rats) > 5,000 mg/kg.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Keep product in heated storage prior to use.

Safety information, see page 25

Cygon 480 EC/Cygon 480/ Cygon Hopper Stopper/ Lagon 480E/Dimethoate Plus (dimethoate)

Group 1B

Manufacturer: Interprovincial Co-operatives/United Agri Products Canada Inc./
Peacock Industries/Cheminova Canada



Warning Poison

- Formulations:** Emulsifiable concentrate; **Cygon 480 EC:** 480 g/L (PCP# 9807); 10 L.
Cygon 480: 480 g/L (PCP# 25651); 10 L. **Lagon 480E:** 480 g/L (PCP# 9382); 10 L.
Dimethoate Plus: 400g/L (PCP# 20402); 10 L. **Hopper Stopper bran bait:** 5.2% 20 kg box.
- Registered Mixes:** None.
- Crops:** See crop/insect controlled and rate chart.
- Insects Controlled:** See crop/insect controlled and rate chart.
- When Used:** Apply when economic damage is apparent. Repeat if necessary.
- How to Apply:**

With: Aircraft or ground equipment.

Rate: Use lower rate for young insects, minor infestations or sparse foliage; higher rate for adult insects (beetles and winged grasshoppers), severe infestations or dense foliage.

Crop	Insect controlled	Rate mL/ac
Lagon 480E		
Alfalfa (hay or seed)	Plant bugs	444
Beans	Aphids, bean beetles, leafhoppers, leaf miners, mites	283 - 404
Canary grass	Aphids	202
Cereals	Grasshoppers	222 - 404
Flax	Potato aphids	177
Forage crops	Grasshoppers	172 - 222
Pasture/wasteland	Grasshoppers	222 - 404
Peas	Aphids	111 - 172
Potatoes	Aphids, leafhoppers	222 - 444
Safflower	Grasshoppers (nymphs and adults)	222 - 404
Dimethoate Plus		
Alfalfa	Lygus bugs, plant bug,s potato leafhoppers	344 - 407
	Pea aphids, grasshoppers	212
Beans	Aphids, bean beetles, leafhoppers, leafminers, lygus bugs, tarnished plant bugs	344 - 505
Cereals	Grasshoppers*	212 - 484
	Say's stink bug	283
Forage crops and pastures	Grasshoppers*	212 - 484
	Sweet clover weevil	484 - 606

(continued)

Safety information, see page 25

Insecticide

Cygon 480 EC/Cygon 480/Cygon Hopper Stopper/Lagon 480E/Dimethoate Plus (cont'd)*(continued)*

Peas	Aphids	142 - 212
Potatoes	Aphids, leaf hoppers	283

Cygon 480/Cygon 480 EC

Alfalfa (for seed and forage production)	Aphids, leafhoppers, lygus bugs, plant bugs reduction of alfalfa weevil	171
	Blotch leafminers, grasshoppers (nymphs)	222
	Grasshoppers (adults)	344 - 364
Alfalfa (seed production)	Lygus bugs, plant bugs	444
Alike clover, red clover, sweet clover	Sweet clover weevil	344 - 444
Barley, oats, rye wheat	Grasshoppers (nymphs), say's stink bug	222
	Grasshoppers (adults)	344 - 404
Barley, oats, wheat	Aphids, thrips	404
	Russian wheat aphids (suppression)	172
Beans (pole, snap)	Aphids, bean beetles, leafhoppers, leafminers, lygus bugs, mites, tarnished plant bugs	283 - 404

Crop	Insect controlled	Rate mL/ac
Cygon 480/Cygon 480 EC		
Canary grass (seed production)	Aphids	202
Canola	Aphids, grasshoppers, leafhoppers	344 - 364
Flax	Potato aphids	173
Forage crops (grasses, hay, clover, trefoil)	Lygus bugs, plant bugs	172
	Grasshoppers (low infestation)	172
	Grasshoppers (nymphs)	222
	Grasshoppers (adults)	344 - 404
	Grasshoppers (nymphs)	222
Pasture, wasteland	Grasshoppers (adults)	344 - 444
	Grasshoppers (nymphs)	222
Peas	Aphids	111 - 172
Potatoes	Aphids, leafhoppers, tarnished plant bugs	222 - 444
Safflower	Grasshoppers	222 - 404
Wheat	Orange blossom wheat midge, Russian wheat aphid	404

Cygon Hopper Stopper Bran Bait

Cereals, forages, roadsides, waste areas	Grasshoppers	323 - 449 g/ac
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* Use higher rate if mature grasshoppers present.

Note: Check product label to ensure the registration for a pest insect is covered by the company.

Water volume: 18 L/ac for good coverage. Potatoes: 80 L/ac minimum; Safflowers: 9 L/ac.

Nozzles: Flat fan recommended.

- 7. Application Tips:** Not suitable for application in oil. Do not use when bees are foraging. When using foliar sprays, do not apply during heat of the day or when temperatures are excessively high.

Safety information, see page 25

8. **How it Works:** Dimethoate is a broad-spectrum – systemic and contact – organophosphate insecticide and acaricide.
9. **Grazing, Cropping and Other Restrictions: Do not treat when bees are foraging.** Do not apply to crops such as alfalfa when in full bloom. Remove cattle prior to spraying.
Preharvest intervals (days): Alfalfa and forage crops: 171 - 222 mL/ac (2), 344 - 364 (28), beans (7), canary grass (21), canola (21), clover (28), peas (3), potatoes (7), safflower (21), wheat (21).
Grazing restrictions (days): Beans do not feed or allow livestock to graze treated forage. Alfalfa and forage crops 171 - 222 mL/ac (2), 344 - 364 (28), canola (21), clover (21), pasture waste land (28), peas (21), wheat (7).
Maximum allowable applications per season: Alfalfa seed (1), canola (repeat only when necessary), flax (1), safflower (2).
10. **Toxicity:** High acute mammalian toxicity. Acute oral LD₅₀ (rats) = 500 - 680 mg/kg, technical = 180 - 336 mg/kg. Highly toxic to birds, bees and other animals. Can be absorbed through the skin. Do not use when bees are foraging.
11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** Store between 5°C and 30°C, away from feed and food.

Decis (deltamethrin)

Manufacturer: Bayer CropScience Inc.

Group 3



Danger Poison

1. **Formulations: Decis 5 EC:** Emulsifiable concentrate; 50 g/L (PCP# 17734); 2.4 L jugs.
Decis 5 F: Flowable; 50 g/L; 3 L jugs.
2. **Registered Mixes:** Banvel, Buctril M, 2,4-D, Hoe-Grass II, MCPA, Pardner, Stampede, Puma¹²⁰ Super, Puma¹²⁰ Super + Buctril M.
Mixing restrictions: Do not mix with any other chemicals, additives or fertilizers.
3. **Crops:**
Decis 5 EC: Alfalfa (for seed production only), barley, canola, fence rows, field corn, flax, lentils, mustard, oats, pastures, potatoes, rangeland, roadsides, sugar beets, sunflowers, wheat (all types). Consult product label for additional shelterbelt or horticulture uses.
Decis 5 F: Barley, canola, flax, lentils, mustard, oats, pastures, rangeland, wheat (all types). Consult product label for additional shelterbelt or horticulture uses.
4. **Insects Controlled:**

Decis 5 EC			
alfalfa weevil	Colorado potato beetle	flea beetles	potato flea beetle
Bertha armyworm	cutworms	grasshoppers	sunflower beetle
cabbage seedpod weevil	diamondback moth	leafhoppers	tarnished plant bug
clover cutworm	European corn borer	lygus bugs	

Decis 5 F: Only flea beetles and grasshoppers.
5. **When Used:** When economic damage is apparent. Grasshoppers: Best results on young (non-flying) grasshoppers (2 - 4 nymphal stage). Sunflower beetle: When crop is in cotyledon to 2 leaf stage. European corn borer: Apply when egg masses begin to hatch. Consult your crop specialists for appropriate spray schedule.

Safety information, see page 25

Decis (cont'd)

Number of applications: Maximum of 1 per year on Bertha armyworm, cutworms, diamondback moth, potato flea beetle, sunflower beetle. Other pests, maximum of 3 per year. Only 1 aerial application per year except for grasshoppers and potato pests, which can be sprayed twice per year by air.

6. How to Apply:

With: Aircraft: Decis 5 EC and 5 F: Barley, canola, flax, lentils, mustard, oats, pastures, rangeland, wheat. Decis 5 EC only: potatoes, sunflowers. Ground equipment: All crops.

Rate: Use a higher rate for severe infestations, when foliage is dense or when grasshoppers are in the late nymphal or adult stage.

Crop	Insects	Decis 5 EC mL/ac
Alfalfa (seed production only)	Alfalfa weevil, lygus bugs	80 - 100
Barley, flax, oats, pasture, rangeland, sugar beets, wheat	Cutworms	80
	Grasshoppers	40 - 60
	Bertha armyworm, clover cutworm, diamondback moth, flea beetles, grasshopper	40 - 60
Canola, mustard, rapeseed	cabbage seed pod weevil*	80
	lygus bug	60
	European corn borer	100 - 120
Field corn	Beet webworm, clover cutworm	40 - 60
Flax	Colorado potato beetle, leafhoppers, potato flea beetle, tarnished plant bug	40 - 60
Potato	Buckthorn aphid, potato aphid	100
	Sunflower beetle	40
Crop	Insect	Decis 5 F mL/ac
Barley, flax, lentils, oats, pastures, rangeland, roadside, wheat	Grasshoppers	32 - 50
	Flea beetles	40 - 60

* Adults only, once per season.

Note: Decis 5 EC on high organic (muck) soils: apply 80 mL/ac. Apply only once during each crop year, prior to August 1.

Water volume: Air: Decis 5 EC and 5 F: 4.4 - 8.8 L/ac. Ground: Decis 5 EC: Alfalfa 40 - 120 L/ac; Field corn 100 L/ac minimum; Potatoes 80 - 200 L/ac. Decis 5 EC and 5 F: Canola, mustard 40 L/ac; Cereals 40 - 80 L/ac.

Pressure: Air: 200 kPa minimum. Ground: 275 kPa.

Nozzles: Aerial droplet size 150 - 250 micron recommended. Flat fan only.

Decis 5 F: 50 mesh or larger line strainers and screens.

7. Application Tips:

Air application: Leave 100 m border between edge of treated fields and environmentally sensitive areas (e.g. wetlands, sloughs, rivers, houses, farm buildings). Best control is achieved by morning or evening applications. Do not spray under a strong temperature inversion or when temperature exceeds 25°C. With severe flea beetle and grasshopper infestations, spray fence rows and a 15 m strip into adjacent summerfallow and cropped fields. For grasshoppers use high EC rate only.

8. How it Works: Deltamethrin is a non-systemic, synthetic pyrethroid that works by contact and ingestion.

Expected results: Speed of kill depends on target insect and environmental conditions, and death can occur within 2 hours.

Effects of rainfall: Do not apply within 1 hour of rain.

Safety information, see page 25

Movement in soil: Becomes fixed on soil colloidal particles and broken down by micro-organisms.

- 9. Grazing, Cropping and Other Restrictions: Pre-harvest interval (days):** Alfalfa (20), barley (40), canola (7), flax (40), lentils (30), mustard (7), oats (31), potatoes (3), sunflower (70), wheat (40).

Grazing: Beef and dairy cattle may graze treated fields immediately after application.

Maximum allowable applications per year: Alfalfa for seed production only (1); field and sweet corn for European corn borer (3); sweet corn for corn earworm and European corn borer (2 – one of which may be by air); barley, flax, oats, wheat for grasshopper (3); strawberries (2).

- 10. Toxicity:** High acute mammalian toxicity. Acute oral LD₅₀ (rats) Decis = 395 mg/kg. Severe eye and skin irritant. Very toxic to aquatic organisms and fish. Toxic to bees and other beneficial insects. Do not apply when bees are foraging.

Caution: Studies have shown that synthetic pyrethroid insecticides can be 1,000 - 10,000 times more toxic to fish than many other insecticides in common use. Careless use of these insecticides can seriously harm sport and commercial fisheries. Entry of these insecticides into small wetlands such as prairie sloughs can affect invertebrate life that is needed for waterfowl reproduction and fish farming. Maintain a **minimum** 30 metre buffer for ground application and a **minimum** 100 metre buffer for aerial application. Applications should not be made when wind or rain could favour drift or run-off into lakes, ponds.

- 11. Precautions, First Aid:** Check label for first aid information.

- 12. Storage:** Do not store below freezing. Do not store near feed or food. Keep away from heat, sparks and open flames.

Diazinon (diazinon)

Group 1B

Manufacturer: United Agri Products Canada Inc./Interprovincial Co-operatives Ltd.



Danger Poison

1. Formulations:

Diazinon 500E: Liquid; 50% diazinon (PCP# 11889); 4 L, 10 L.

Diazinon 50EC: Emulsifiable concentrate; 500 g/L diazinon (PCP# 27538); 10 L.

Diazinon 50W: Wettable powder; 50% diazinon (PCP# 19576); 2 kg.

2. Registered Mixes:

Surfactants: None.

Mixing instructions: To prepare the spray, add water to the spray tank, add diazinon formulation, and with agitation on, add the remaining water required for the sprayed area. Maintain agitation during mixing and application. Do not allow spray mixtures to sit overnight.

- 3. Crops:** Beans, potatoes, ditch banks, fence rows, pasture, rangeland, roadsides, wasteland.

- 4. Insects Controlled:** Aphids, Colorado potato beetle, flea beetles, grasshoppers, leafhopper.

- 5. When Used:** Apply when pests appear and repeat as required. Refer to the product label for pest and crop specific instructions.

6. How to Apply:

With: Ground equipment only. Do not apply by air.

Rate: See product labels for formulation specific rate.

Water volume: Water volume should be adequate to provide sufficient coverage.

- 7. Application Tips:** Diazinon will work more effectively if the temperature is 20°C or more or when temperatures will reach or exceed this minimum. Do not apply during bloom as diazinon is toxic to bees.

Diazinon (cont'd)

- 8. How it Works:** Diazinon is an organophosphate insecticide with systemic and contact activity.
- 9. Grazing, Cropping and Other Restrictions:** Do not harvest crops for 3-14 days after the last application; see label for crop specific restrictions. Do not graze or feed immature crops within 14 days of harvest. Succeeding crops: no restrictions.
- 10. Toxicity:** Acute oral toxicity LD₅₀ (rats) = <50 mg/kg, Dermal toxicity LD₅₀ (rats) = <200 mg/kg.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store in a cool, dry place and in such a manner as to prevent cross contamination with other pesticides, fertilizers, food and feed. Store in original container and out of reach of children.
- 13. Resistance Management:** See page 41 for information on resistance management.

Dibrom (naled)**Group 1B**

Manufacturer: United Agri Products Canada Inc.

- 1. Formulations:** Emulsifiable concentrate; 864 g/L (PCP# 7442); 2 x 9.46 L.
- 2. Registered Mixes:** This product is compatible with most insecticide and fungicide formulations. Do not use with alkaline materials such as lime or bordeaux.
- 3. Crops:** Alfalfa, beans, clover, field areas, pastures, potato, rangeland, sugar beets, vetch.
- 4. Insects Controlled:** Aphids, Colorado potato beetles, flea beetles, grasshoppers, leafhoppers, loopers, lygus bugs.
- 5. When Used:** Begin application at first sign of insects. Repeat as necessary.
- 6. How to Apply:** Apply Dibrom by ground or air. Use designated amounts in full volumes of water.
Ground application: Dilute with water to 100 - 300 L/ha unless otherwise stated.
Aerial application: Unless otherwise stated, dilute with water to 10 - 30 L/ha when aerial application is specified.

Rates:

Crop	Insects	Rate	Application
Alfalfa, clover, vetch	Aphids, leafhoppers, loopers, lygus bugs	445 - 890 mL/ac	Use ground or aerial application.
Beans, peas for processing	Alfalfa looper, aphids, red spider mites	445 - 890 mL/ac	Use ground or aerial application.
Potatoes	Colorado potato beetle, flea beetle, leafhoppers	445 mL/ac	Use ground or aerial application.
Sugar beets	Leafhoppers, red spider mites	890 mL/ac	Do not apply within 5 days of harvest. Use ground application.
Dairies, field areas, pastures, range land	Grasshoppers	Young hoppers: 222 - 344 mL/ac Adult grasshoppers: 283 - 404 mL/ac	Use ground or aerial application.

Note: Grasshoppers - add sufficient water to give a thorough cover and contact spray. Effect of Dibrom may be observed within a few hours. If grasshoppers move in from surrounding areas, repeat treatment as required. Animals may be present during treatment. Use ground or aerial application.

Safety information, see page 25

Corrals, adjacent pastures, holding pens (beef and dairy cattle, hogs, horses, sheep): Adult houseflies, mosquitoes – Airplane application – use 110 - 275 mL of Dibrom per hectare (110 - 275 g ai/ha). Dilute 1.5 - 3 L in 100 L water. Apply 9 L diluted spray/ha. Apply over areas with animals present. Repeat as necessary to maintain pest control. To supplement control, treat buildings and protected areas with a space spray, with rotating motion for 2 minutes. Scatter resulting bait on floors, window sills and loading docks in barns, kennels, around garbage cans, refuse areas and other places where flies congregate. Use 90 - 125 g/100 m². Repeat as necessary. Bait will remain effective for 2 or 3 weeks. Keep in closed container.

- 7. Application Tips:** Thorough coverage required. Do not apply when temperature is over 32°C.
- 8. How it Works:** Works through contact action.
- 9. Grazing, Cropping and Other Restrictions:** Do not apply to food or forage crops within 4 days of harvest or grazing. Do not allow worker entry into treated areas (indoor or outdoor) for 48 hours following application.
- 10. Toxicity:** This product is an organic phosphate insecticide. If symptoms of cholinesterase inhibition appear, atropine sulfate by injection is antidotal. 2-PAM is also antidotal and may be administered, but only in conjunction with atropine.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Do not reuse this container for any purpose. This is a recyclable container and is to be disposed of at a container collection site. Contact your local distributor/dealer or municipality for the location of the nearest collection site.

ECO Bran (carbaryl)

Group 1A

Manufacturer: Peacock Industries Inc.

- 1. Formulations:** 2% carbaryl (PCP # 25815); 20 kg bag.
 - 2. Registered Mixes:** None.
 - 3. Crops:** Cereal crops, forages, pasture, roadsides, waste areas.
 - 4. Insects Controlled:** Grasshoppers.
 - 5. When Used:** Apply when pest emergence is at its peak and grasshopper populations are above the economic threshold. Repeat application only as necessary, but not more frequently than once a week during periods of heavy infestation and once every two weeks during moderate to low infestation.
 - 6. How to Apply:**

With: Ground equipment only. **Do not apply by air.**

Rate: 0.8 - 1.6 kg/ac. Note: The higher rate should be used for older grasshoppers or severe infestation.
 - 7. Application Tips:** Timing is essential for effective control. Do not apply within 50 meters of sloughs, ponds, streams, dugouts or open water. Apply when winds are between 3 - 8 kph and do not favor drift.
 - 8. How it Works:** A carbamate insecticide that works by ingestion. Moderate to rapid in speed of action with moderate to long residual effectiveness (2 days to 4 weeks) depending on crop/pest complex, formulation and climatic conditions.
- Effects of rainfall:** Do not apply just before rain.
- Movement in soil:** None.

ECO Bran (cont'd)

- 9. Grazing, Cropping and Other Restrictions:** Pre-harvest or pre-grazing interval (days): Barley, sweet white lupin (28); canola (treat only seedling); beans (5); oats, rye, wheat (14); field corn, sweet (1); alfalfa, clovers (2), forage crops (2); field borders, headlands, rights-of-way; roadsides, wasteland (0). Livestock re-entry period to pasture or rangeland (days): Beef cattle or other livestock (1), dairy cattle (2).
- 10. Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) = 540 mg/kg. Although carbaryl is toxic to honey bees, presence of ECO Bait on flowering crops such as alfalfa and clover will not harm foraging honey or leafcutter bees.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store away from food and feed. Keep dry.
- 13. Resistance Management:** See page 41 for information on resistance management.

Furadan (*carbofuran*)**Group 1A**

Manufacturer: Nufarm Agriculture Inc.



Danger Poison

- 1. Formulations:** Flowable; 480 g/L (PCP# 10828); 4 x 4 L pack.
- 2. Registered Mixes:** Furadan 480: all formulations of 2,4-D and MCPA (use only on crops listed on both labels). Compatible with most fungicides. Do not mix with Bordeaux mixture or hydrated lime.
- 3. Crops:**

canola	mustard	silage corn	sweet corn
field corn	potatoes	sugar beets	

4. Insects Controlled:

aphids	flea beetles	potato leafhopper
Colorado potato beetle	leafhoppers	sugar beet root maggot
European corn borer	potato flea beetle	tarnished plant bug

5. When Used:

Aphids, Colorado potato beetle, potato flea beetle, potato leafhopper, tarnished plant bug: Apply as soon as insects reach threshold level.

European corn borer: No later than when first feeding is seen on foliage. Follow provincial recommendations based on the moth flight monitoring program. For second brood borers in late planting, apply before tassels show.

Flea beetles: Apply about 2 weeks after seeding or when insects are noticeable.

Sugar beet root maggots: Apply at the very early stage of root maggot activity, usually the first week in June. Application must be followed with light sprinkle irrigation to incorporate Furadan.

Sunflower beetle: Apply when these insects are first noticeable. Do not apply after plants are more than 60 cm in height or after heads have started to form.

6. How to Apply:

With: Aircraft (excluding potatoes) or ground equipment.

Rate:

Crop	Insects	mL/ac
Canola, mustard	Flea beetles	60
	Red turnip beetle	111
Field corn, silage corn, sweet corn	European corn borer	445
	Potato leafhopper, tarnished plant bug	445
Potatoes	Colorado potato beetle, potato flea beetle	225 - 445
	Sugar beet root maggot	950
Sugar beets	Sunflower beetle	111

Water volume: Air: 8 L/ac minimum. Ground: 40 L/ac minimum. Potatoes: 325 - 405 L/ac. Use sufficient water for thorough coverage.

Sugar beets: 80 L/ac as a drench over the row followed by a light sprinkler irrigation to incorporate Furadan into the soil.

Pressure: Potatoes: 275 kPa minimum.

Nozzles: Flat fan recommended.

7. Application Tips: Check fields shortly after emergence. Boom sprayers: equip with hydraulic or mechanical agitation and 50 mesh screens; remove any felt filters.

8. How it Works: Carbofuran is a broad-spectrum, carbamate insecticide, acaricide and nematicide.

9. Grazing, Cropping and Other Restrictions: Pre-harvest interval or pre-grazing interval (days): Canola (60); corn (7); mustard (21), potatoes (7); sunflower (60).

Pre-grazing interval: Corn (3).

Maximum allowable application per season: Corn, potatoes, sunflower (2).

Sugar beet tops and pulp may be fed to beef and dairy cattle without causing residues in meat or milk.

10. Toxicity: High acute mammalian toxicity. Acute oral LD₅₀ (rats) = technical 11 mg/kg, Flowable 480 = 38 mg/kg. Highly toxic to bees, waterfowl, birds, fish and other wildlife.

11. Precautions, First Aid: Check label for first aid information.

12. Storage: Do not store below 2°C.

Gaucha 480/Gaucha CS FL

(imidacloprid + carbathiin + thiram)

Insecticide - Fungicide

Group 4 (Insecticide) Group 7,M (Fungicide)

Manufacturer: Bayer CropScience Inc.



Caution Poison

1. Formulations: Gaucha 480: Flowable; 480 g/L imidacloprid (PCP# 26124).

Gaucha CS FL: Flowable; containing 285.7 g/L imidacloprid + 47.6 g/L carbathiin + 95.3 g/L thiram (PCP# 27174).

2. Registered Mixes: Gaucha 480 is only available to commercial treaters. The following two systems are available for treated canola, mustard and rapeseed:

Gaucha 480/Gaucha CS FL (cont'd)

Gaucha Canola System which is a combination of Vitavax rs Fungicide, metalaxyl and Gaucha 480 at the low rate applied to the seed or Gaucha CS at 1,400 mL plus metalaxyl. **Gaucha Platinum** is a combination of Vitavax rs Fungicide, metalaxyl and Gaucha 480 at the high rate applied to the seed or Gaucha CS at 1,400 mL plus metalaxyl and Gaucha 480 at 833 mL.

- 3. Crops:** Canola, oilseed mustard, rapeseed.
- 4. Insects Controlled:** Flea beetle. The fungicides in the two other products in the Gaucha Canola System and Gaucha Platinum will protect against seed-borne blackleg, seed rot and seedling blight caused by *Alternaria*, *Pythium* and *Rhizoctonia*. Gaucha at the high rate (Gaucha Platinum) is also approved for control of aphids, suppression of exit hole damage to pods from seed pod weevil larvae and the suppression of second generation of lygus.
- Diseases controlled:** Control of seed rot, damping off, seedling blight and early season root rot caused by *Pythium*, *Rhizoctonia* and *Alternaria* on oilseed mustard.
- 5. When Used:** Available to custom seed applicators only. Rate of Gaucha 480 is 833 - 1,667 mL per 100 kg of seed. Rate of Gaucha CS is 1,400 mL per 100 kg of seed. Treated seed should be tested for germination if stored for more than 9 months.
- 6. How to Apply:** Must be applied with a suitable colourant. Can be applied with the Magna Coat Coating. Gaucha CS is a ready-to-use product with colourant.
- 7. Application Tips:** Applicators should consult with Gustafson regarding application procedures for the different products.
- 8. How it Works:** Imidacloprid is a systemic insecticide, and it is absorbed into the germinating seed and seedling to protect the plant from feeding. Some damage will occur as the flea beetle must ingest the plant for mortality to occur. Imidacloprid has direct toxic effects and anti-feeding effects on flea beetles. The higher rate will extend the level of protection.
- 9. Grazing, Cropping and Other Restrictions:** Do not graze or feed livestock for 4 weeks after planting.
- 10. Toxicity:** Moderate acute toxicity. Acute LD₅₀ (rats) = 400 mg/kg. Safe to bees foraging on plants when applied as a seed treatment.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store product in original container only, away from other pesticides, fertilizer, food or feed. Do not store Gaucha 480 FL in direct sunlight. Do not store Gaucha 480 FL above 35°C or below 10°C.
- 13. Resistance Management:** See page 41 for information on resistance management.

Genesis (imidacloprid)

Manufacturer: Bayer CropScience Inc.

Group 4



Caution Poison

- 1. Formulations:** Flowable; 240 g/L imidacloprid (PCP# 27349); 3.8 L.
- 2. Registered Mixes:** Apply sequentially before fungicide dusts application.
- 3. Crops:** Potatoes.
- 4. Insects Controlled:** Control of aphids, Colorado potato beetle, flea beetle, potato leaf hopper.
- 5. When Used:** Seed treatment. Apply just prior to seeding. Can be applied when potato pieces are being cut.
- 6. How to Apply:** Apply specified dosage as a diluted spray onto seed-pieces using a shielded spray system that is well contained and will prevent the loss of any liquid. Do not dilute with any more than 3 parts water to 1 part Genesis 240 insecticide. Agitate or stir spray solution as needed. For optimal insect control, good coverage of the seed piece is required.

Safety information, see page 25

- 7. Application Tips:** As part of the seed cutting and treating process, application of a fungicide registered for potato seed treatment or an inert absorbent ingredient is recommended immediately after applying liquid Genesis.
- 8. How it Works:** Imidacloprid is a systemic chloronicotinyl insecticide.
- 9. Grazing, Cropping and Other Restrictions:** Treated areas may be replanted with any crop specified on an imidacloprid label, or any crop for which a tolerance exists for the active ingredient, as soon as is practical. Rotation of fields treated with Genesis 240 insecticide to cereal grains (wheat, barley, oats) is acceptable after a minimum plant-back interval of 30 days and to peas and beans (including fababeans, soybeans, adzuki beans, mung beans, lima beans, scarlet runners, dry common beans, snap common beans) is acceptable after a minimum plant-back interval of 9 months. Rotation to all other food and feed crops will require a 12 month plant-back interval be observed. Green manure and other cover crops not intended for human or animal consumption are acceptable rotational crops that do not require a plant-back interval following treatment. Do not graze or harvest such cover crops for food or feed. It is not recommended that this product be used in fields treated with Genesis 240 insecticide or Admire 240 F insecticide during the previous season. This product is toxic to wildlife. Keep out of lakes, streams, ponds or other aquatic systems. Do not contaminate water when disposing of equipment wash waters. Apply this product only in accordance with the label directions. Dispose of all excess and any spilled treated seed pieces by covering or incorporating into the soil. Leftover treated seed should be double sown around the headland or buried away from water sources such as lakes, streams, ponds or other aquatic systems.
- 10. Toxicity:** Acute oral toxicity LD_{50} (rats) = 4, 143 - 4,870 mg/kg. Dermal toxicity of (rabbits) = 200 mg/kg.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store in cool, dry place and in such a manner as to prevent cross contamination with other pesticides, fertilizers, food and feed. Store in original container and out of reach of children.

Helix/Helix XTra (thiamethoxam + difenoconazole + metalaxyl-M + fludioxonil)

Insecticide – Fungicide

Group 4 (Insecticide) Group 3,4,12 (Fungicide)

Manufacturer: Syngenta Crop Protection Canada Inc.



Caution Poison

1. Formulations:

Helix: Flowable seed treatment; containing 10.3% thiamethoxam, 1.24% difenoconazole, 0.39% metalaxyl-M and 0.13% fludioxonil (PCP# 26637).

Helix XTra: Flowable; containing 20.7% thiamethoxam, 1.25% difenoconazole, 0.39% metalaxyl-M and 0.13% fludioxonil (PCP# 26638); 105 L, 200 L, 450 L, 1,050 L bulk.

2. Registered Mixes: None.

3. Crops: Canola, mustard.

4. Insects Controlled: Early season control of flea beetles, duration of control: Helix (14 - 21 days), Helix XTra (28 - 35 days). Both Helix and Helix XTra control flea beetles on Oriental mustard (oilseed type).

Diseases controlled: Seed-borne *Alternaria*, seed-borne blackleg (*Leptosphaeria maculans*), seedling disease complex (damping off, root rot, seed rot), *Fusarium* spp., *Pythium* spp. and *Rhizoctonia* spp.

5. When Used: Seed treatment.

Helix/Helix Xtra (cont'd)**6. How to Apply:**

With: For commercial seed treaters only.

Water volume: Helix and Helix Xtra do not require the addition of water for application.

Rate: Helix and Helix Xtra: 1,500 mL/100 kg of seed. Do not dilute with water.

7. Application Tips: Available only as pretreated seed.**8. How it Works:** The active ingredient difenoconazole is a systemic fungicide from the triazole chemical class that provides broad-spectrum protection against seed and soil-borne diseases. Metalaxyl-M is a phenylamide fungicide with systemic activity against diseases caused by the Oomycetes class, including Pythium damping off. Fludioxonil is a phenylpyrole chemistry derived and synthesized from exudates of the soil bacterium *Pseudomonas*, contact and local penetrant properties.

Thiamethoxam is a systemic insecticide from the neonicotinoid chemical class that acts by interfering with the acetylcholine receptor of the insect's nervous system.

9. Grazing, Cropping and Other Restrictions: Do not graze, feed green forage or cut for hay within 55 days of planting. Do not plant any crop other than wheat within 30 days to fields in which treated seeds were planted. Commercially treated seed with Helix must be labeled with the following statement: **"This seed has been treated with Helix liquid seed treatment which contains the insecticide (thiamethoxam) and the fungicides (difenoconazole, metalaxyl-M and S isomers and fludioxonil). Wear long-sleeve shirt, long pants and chemical-resistant gloves when handling treated seed. Do not use for food, feed or oil processing, store away from food and feed."****10. Toxicity:** Acute oral LD₅₀ (rats) = >5,000 mg/kg – practically non-toxic.

Acute dermal LD₅₀ (rabbits) = >2,000 mg/kg.

11. Precautions, First Aid: Check label for first aid information.**12. Storage:** Keep in heated storage. Product will freeze at -20°C.

Imidan 50-WP Instapak

(phosmet)

Group 1B

Manufacturer: Gowan Company



Danger Poison

1. Formulations: Wettable powder (PCP# 23006); 1 kg water soluble sachets; 2 x 1 kg (50% phosmet).**2. Registered Mixes:** None.**3. Crops*:** Alfalfa, potatoes.

*See label for complete list of registered crops.

4. Insects Controlled: Alfalfa weevil, colorado potato beetle, potato flea beetle, potato leafhopper.**5. When Used:** When first signs of infestation are visible.**6. How to Apply:**

With: Ground equipment.

Alfalfa: Must be added to spray water first, and sachet must be completely dissolved. Use 81 to 202 L of water per acre. Maximum of one application per cutting. Do not apply during bloom. Do not apply 7 days prior to harvest.

Potato: Must be added to spray water first, and sachet must be completely dissolved. Use sufficient water to provide good coverage. Apply as required. Do not apply 7 days prior to harvest.

Safety information, see page 25

Rate:

Crop	g/ac	Crop	g/ac
Alfalfa	910	Potato	910

- 7. Application Tips:** See *How to Apply*.
- 8. How it Works:** Phosmet is a non-systemic, contact, organophosphorous insecticide.
- 9. Grazing, Cropping and Other Restrictions:** Do not apply 7 days prior to harvest on alfalfa or potatoes. This product is toxic to fish. Keep out of any body of water. This product is toxic to bees. Do not apply when fruits or cover crops are in bloom.
- 10. Toxicity:** Acute oral LD₅₀ (rats) = 285 mg/kg.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store above 0°C. Keep water soluble sachets in its protective container and store in a cool, dry place. Do not store at temperatures above 40°C.

Lannate (methomyl)

Group 1A

Manufacturer: E.I. duPont Canada Co.



Danger Poison Caution Flammable

- 1. Formulations:** Soluble powder; 90% (PCP# 10868); 24 x 225 g Toss-N-Go water soluble pouches; 5.4 kg/case.
- 2. Registered Mixes:**
Mixing instructions: Fill spray tank 1/4 - 1/2 full of water. Add the appropriate number of water soluble pouches directly to spray tank, mix thoroughly. Once dissolved, continued agitation is not required. Do not use air agitation; use mechanical or hydraulic agitation.
- 3. Crops:** Barley, canola, flax, oats, peas, potatoes, sweet corn, wheat.
- 4. Insects Controlled:**
- | | | | |
|-----------------|-----------------|---------------------|--------------------|
| alfalfa looper | clover cutworm | European corn borer | leafhopper |
| aphids | common armyworm | flax bollworm | thrips |
| beet webworm | corn earworm | flea beetle | variegated cutworm |
| Bertha armyworm | | | |
- 5. When Used:** When insects are causing economic damage; continue applications at 5 - 7 days intervals or as needed. No restriction on number of applications. Early morning or late evening sprays are recommended.
- Aphids:** Apply up to 3 applications at 5 day intervals.
- Corn earworm:** Apply 4 sprays at 2 - 4 day intervals beginning when 25% of the ear shows silk.
- European corn borer:** Apply at 5 day intervals when egg masses begin to hatch.
- 6. How to Apply:** Refer to the label for application instructions.
- With:** Aircraft (barley, canola, flax, oats, wheat) or ground equipment (all crops).
- Rate:** Low rate only for very young insects, small plants or light infestations.

Lannate (cont'd)

Crop	Insect	g/ac
Barley, oats, wheat	Common armyworm	109 - 218
	Thrips	121
Canola	Alfalfa looper, armyworm, Bertha webworm, beet webworm, clover cutworm	87 - 206
	European cornborer	250
Flax	Bertha armyworm, flax bollworm	89 - 109
Peas	Alfalfa looper, aphids	200
Potato	Aphids, flea beetles, leafhoppers	215
	Variegated cutworm	109 - 218
Sweet corn	Aphids, corn earworm	175 - 250
	European corn borer	253

Water volume: Air: 9 L/ac minimum. Ground: 40 - 140 L/ac.

7. **Application Tips:** Refer to the label for application instructions.
8. **How it Works:** A carbamate insecticide that works by contact and ingestion and has some systemic action. Rapidly degraded in green, growing plants; short-term residual. Rapid knock-down.
9. **Grazing, Cropping and Other Restrictions:** Pre-harvest interval (days): barley, oats, wheat (20); canola, flax (8); peas (1); potatoes, sweet corn (3).
10. **Toxicity:** High acute mammalian toxicity. Acute oral LD₅₀ (rats) = technical 17 - 24 m/kg. Toxic to bees. May be fatal or cause blindness if swallowed. Poisonous if inhaled. Causes eye damage. Can be absorbed through the skin. Intake can cause heart, liver and kidney damage.
11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** Store product in original container only. Store away from other pesticides, fertilizer, food or feed. Not for use or storage in or around the home. Do not allow the product to freeze.

Lorsban 4E/ Pyrinex 480 EC/Nufos 4E/ Citadel 480 EC (chlorpyrifos)

Group 1B

Manufacturer: Dow AgroSciences/MANA Canada/Cheminova Canada/Interprovincial Co-operatives



Danger Poison

1. **Formulations:** Emulsifiable concentrate; 480 g/L; 10 L jug, 208 L returnable container.
Lorsban 4E (PCP# 14879). Pyrinex 480 EC (PCP# 23705). Nufos 4E (PCP# 25831).
Citadel 480 EC (PCP# 27479).
 2. **Registered Mixes:** Avenge 200C, Banvel + 2,4-D amine, Buctril M, 2,4-D amine, 2,4-D ester, MCPA amine, MCPA ester. Citadel is also registered with Logic M.
- Mixing restrictions:** Do not add adjuvants, surfactants or spreader stickers other than those allowed on mixing partner label. When tank mixing, first add the herbicide to spray tank, then add Lorsban 4E, Pyrinex 480 EC, Nufos 4E or Citadel 480 EC.

Safety information, see page 25

3. Crops: Barley, canola, field corn, flax, lentils, oats, potatoes, sugar beets, sunflowers, sweet corn, wheat.

4. Insects Controlled:

alfalfa looper	common armyworm	pale western cutworm	sunflower seed weevil
army cutworm	dark-sided cutworm	potato flea beetle	tarnished plant bug
Bertha armyworm	diamondback moth larvae	red-backed cutworm	variegated cutworm
black cutworm	grasshoppers	Russian wheat aphid	wheat midge
Colorado potato beetle larvae	lygus bug		

5. When Used: When economic damage is apparent or when insect numbers reach the economic threshold.

Wheat midge: When adults are found in crop (1 midge/4 - 5 wheat heads). When 25% of wheat head has emerged from boot, but preferably delayed until flowering (in 30% of crop).

Number of applications: Once per season as a foliar, seedling or soil treatment. Maximum of 9 weekly applications on potato foliage.

6. How to Apply:

With: Aircraft or ground equipment.

Rate: Use lower rate for young insects, light infestations or sparse foliage.

Crop	Stage	Insects	mL/ac
Barley, oats, wheat	foliage	Armyworm, army cutworm, dark-sided cutworm, pale western cutworm, red-backed cutworm	355 - 485
		Brown wheat mite	250
		Grasshopper (nymphs)	235
		Grasshopper (adults)	355
		Russian wheat aphid	202
		Wheat midge	335 - 405
Canola	foliage	Alfalfa looper, Bertha armyworm, common armyworm	305 - 405
		Diamondback moth larvae	405 - 607
		Grasshoppers	235 - 355
		Lygus bug	202 - 405
Canola, flax	seedling	Army cutworm, dark-sided cutworm, pale western cutworm, red-backed cutworm, variegated cutworm	355 - 485
Field corn, potatoes, sweet corn	preplant	Black cutworm, dark-sided cutworm, red-backed cutworm	970
	seedling	Black cutworm, dark-sided cutworm, red-backed cutworm	485 - 970
Flax	seedling	Bertha armyworm	305 - 405
Lentils (Lorsban and Citadel only)	seedling	Cutworms	275 - 485
	seedling	Pale western cutworm	355 - 485
	foliage	Grasshoppers	235 - 485
Potatoes	foliage	Colorado potato beetle, potato flea beetle, tarnished plant bug	405
Sugar beets	seedling	Pale western cutworm, red-backed cutworm	485 - 970
Sunflower	seedling	Army cutworm, pale western cutworm, red-backed cutworm, seed weevils	485

Water volume:

Air: 4 - 12 L spray solution/ac.

Ground: 20 - 80 L spray solution/ac.

Nozzles: Flat fan recommended.

Lorsban 4E/Pyrinex 480 EC/Nufos 4E/Citadel 480 EC (cont'd)

- 7. Application Tips:** Uniform coverage of crop is essential: use a boom configuration that provides optimum coverage. Use higher rates when infestations are heavy and when foliage is dense.
- Bertha armyworm, alfalfa looper and armyworm:** Use higher rate for large larvae and when canopy is dense.
- Cutworms:** Higher rates and water volumes when the top 1 cm of soil surface is extremely dry or when the infestation is heavy.
- Foliage treatments:** When spraying crops near maturity, an application system that gives maximum penetration of the crop canopy is necessary to get good insect kill. Do not apply to crops in bloom. Best results will be obtained when application is made during early evening.
- 8. How it Works:** A broad-spectrum, non-systemic insecticide. Works by contact, ingestion and vapour action.
- Expected results:** Insects must come in direct contact with the insecticide to be affected. Degrades on foliage by weathering, and a significant kill of insects eating treated foliage may not last beyond 48 hours after treatment. Somewhat more persistent in soil; control of soil-dwelling insects may be more durable.
- Effects of rainfall:**
- Foliar treatments:** Should be made 4 - 6 hours before forecast rainfall.
- Soil treatment:** Do not apply if heavy rainfall is forecast. A light rainfall during or after application is probably helpful.
- Movement in soil:** Binds to organic matter in soil and is not likely to leach in soils with some organic matter.
- 9. Grazing, Cropping and Other Restrictions:**
- Re-entry restriction:** Do not enter treated field for at least 24 hours after application.
- Application restrictions: Barley, oats, wheat:** Do not apply more than 2 times per season or more than a total of 2.4 L/ha. See label for restrictions on other crops.
- Pre-harvest interval (days):** Barley, oats, wheat (60), canola (21), corn - field and sweet only (70), flax (21), lentils (21 for applications up to 875 mL/ha), (60 for applications greater than 875 mL/ha), potatoes (7), sugarbeets (90), sunflowers (42).
- Grazing restrictions:** Cereals grown for cover crop treated with chlorpyrifos insecticide should not be harvested for human or animal consumption if treated within 60 days of harvest.
- 10. Toxicity:** High acute mammalian toxicity. Acute oral LD₅₀(rats) formulation = 440 - 900 mg/kg. Toxic to fish. Toxic to bees exposed to direct treatment or residues on blooming crops and weeds. Avoid use when bees are actively foraging.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Combustible liquid; keep away from heat, sparks and open flame.

Malathion (*malathion*)

Group 1B

Manufacturer: United Agri Products Canada Inc./Interprovincial Co-operatives Ltd.



Caution Poison

- 1. Formulations:** Emulsifiable concentrates; **Malathion 500 E:** 500 g/L (PCP# 4709). **Malathion 500:** 500 g/L (PCP# 5821); 4 x 4 pack, 2 x 10 L. **Malathion 85E:** 85% (PCP# 8372); 10 L jug. Malathion grain protector dust: (2%) (PCP# 15896); 20 kg bag. Malathion grain protectant dust: (2%) (PCP# 17222); 20 kg bag.
- 2. Registered Mixes:** None.

Safety information, see page 25

3. Crops: Alfalfa, barley, canary seed, canola, clover, corn, field peas, flax, lentils, mustard, oats, pasture, potatoes, rye, stored grain, sugar beets, sweet clover, wheat. Malathion 500 (PCP# 5821) is not registered for corn, canary seed, peas, mustard or sugar beets.

4. Insects Controlled:

Foliar spray

alfalfa weevil larvae
aphids
armyworms
corn earworm*
cereal leaf beetle

Colorado potato beetle
diamondback moth larvae
English grain aphid
European corn borer
flea beetles

grasshoppers
greenbug
leafhoppers
lygus bug
pea aphid*

pea weevil*
spider mite
spittle bug (adults)
sweet clover weevil
winter grain mite

Stored grain treatment

confused flour beetle
flat grain beetle
grain mites

granary weevil
Indian meal moth
lesser grain borer

merchant grain beetle
red flour beetle*
rice weevil*

rusty grain beetle
saw-toothed grain beetle

* Not registered for control with Malathion 500 (PCP# 5821).

5. When Used:

Foliar spray: Legumes: When economic thresholds are reached. Do not apply to legumes in bloom.

Sweet clover: Spray field margins of first year clover in late summer or early fall when migration of weevil adults is occurring. Canola, flax: When bees are absent from field and temperatures is above 18°C.

Sugar beets: At 3 - 5 leaf stage when insects or damage first appears.

Stored grain treatments: To be used only for stored cereal grains and corn. As grain is being loaded or turned into final storage. Surface protectant - immediately after grain is loaded into storage.

Storage protectant: Prior to filling of grain storage structures.

6. How to Apply:

Emulsifiable concentrates - With: Aircraft or ground equipment.

Rate: Use lower rate for immature insects, light infestations or sparse foliage.

Crop	Insects	Malathion 500	Malathion 85E
		L/ac	L/ac
Alfalfa	Alfalfa weevil larvae, aphids, grasshoppers, leafhoppers, lygus bugs, spittlebugs (adult), spider mites	0.91 - 1.1	0.45 - 0.54
Barley, oats, wheat	Armyworms, English grain aphids, greenbugs, winter grain mites	0.44 - 1.01	0.45 - 0.54
Canola, flax, mustard, pasture	Grasshoppers	0.4 - 1.1	0.11 - 0.35
Clover	Aphids, grasshoppers, leafhoppers, spider mites	0.91 - 1.1	0.45 - 0.54
Flax	Grasshoppers	0.44 - 0.78	0.22 - 0.35
Grain corn, forage corn	Earworms, European corn borer	0.91 - 1.1	0.45 - 0.54
Peas	Leafhoppers, pea aphid, pea weevil	0.9	0.54
Rye	Cereal leaf beetle	0.9	0.45 - 0.54

Water volume: Potato pests: 400 L/ac.

Nozzles: Flat fan recommended.

Stored grain treatments - With: Spray or dust applicators.

Malathion (cont'd)**Rate:**

Insect	Grain	Liquid g/1,000 kg grain	2.0% Dusts g/1,000 kg grain
Confused flour beetle,	Barley	12	520
flat grain beetle, grain mites,	Corn	10	—
granary weevil,	Oats	17	735
Indian meal moth,	Rye	10	450
lesser grain borers,	Wheat	10	415
red flour beetle, rice weevil,			
rusty grain beetle,			
saw-toothed grain beetle			
Indian meal moth	Barley, corn, oats, rye, wheat	300 mL/100m ² of grain surface	—

Note: The Canadian Grain Commission does not recommend the use of grain protectants. Malathion is more effective in dry grain than in tough or damp grain because the pesticide breaks down rapidly.

Water volume: 10 - 20 L water; Indian meal moth (surface treatment) 5 - 10 L water.

Incorporation: Add to grain as it is being augered, or scatter proper amount of dust on each load and cut in with shovel before dumping.

Nozzles: Flat fan recommended.

7. Application Tips:

All crops: Apply when day temperature is expected to exceed 20°C. Do not apply to plants in bloom.

Stored grain: To protect from Indian meal moth, spray evenly over the surface of uninfested grain and rake to a depth of 15 cm. Where special application equipment is not available, any type of low pressure sprayer holding 5 L or more can be used. Apply spray to the grain stream as it is being elevated into storage. Test sprayer calibration by discharging into a tank of water, then regulate flow of grain to get the proper rate of spray. Keep spray coarse to avoid loss as "drift."

Before storing new grain: Thoroughly clean up old grain and debris from bins, elevators or grain handling equipment. Remove and burn all sweepings. After cleaning the premises, apply a residual malathion spray to walls, floors and machinery in grain elevators or farm storage, using 200 mL Grain Protectant/5 L water. Force spray into cracks and crevices. Apply at 5 L of spray/100 m² of surface area using a coarse wetting spray. Wait until spray has thoroughly dried before storing grain in treated areas. Spray this mixture around the outside of bins and elevators to help prevent the insects from entering the bins.

8. How it Works: A non-systemic, contact, organophosphate insecticide and acaricide of brief to moderate persistence. Generally non-phytotoxic. Do not apply foliar sprays at temperatures below 20°C.

9. Grazing, Cropping and Other Restrictions: Pre-harvest and pre-grazing intervals (days): canola (7), cereals (7), flax (7), hay (7), legumes (7), mustard (7), pastures (0), potatoes (3).

Forages and pasture: Remove cattle before spraying; cattle may be returned immediately after spraying.

Stored grain sales: Do not apply within 7 days of selling grain. Do not apply to barley destined for malting, canola, flax or pulses.

10. Toxicity: Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) = 2,800 mg/kg. Highly toxic to bees and fish.

11. Precautions, First Aid: Check label for first aid information.

12. Storage: Flammable. Do not store near food or feed. Keep container tightly sealed when not being used.

Matador 120EC/ Silencer 120EC (cyhalothrin lambda)

Group 3

Manufacturer: Syngenta Crop Protection Canada Inc./MANA Canada



Danger Poison

Insecticide

- 1. Formulations:** Emulsifiable concentrate; 120 g/L (PCP# 24984); 3.78 L jug.
- 2. Registered Mixes:** Horizon, Quadris and Tilt.
- 3. Crops*:** Alfalfa, barley, beans, canola, chickpeas, fababeans, flax, grain corn, lentils, lupins, mustard, oats, peas, popcorn, potatoes, soybeans, summerfallow**, sunflowers, sweet corn, unimproved pasture, wheat.
 - * See labels for Matador and Silencer for complete list of registered crops.
 - ** Matador only registered for summerfallow applications.

4. Insects Controlled:

alfalfa weevil	corn earworm	fall armyworm	pea leaf weevil
Bertha armyworm	crucifer flea beetle	grasshoppers	potato leaf hopper
cabbage looper	cutworm	leafhopper	sunflower beetle
cabbage seedpod weevil	diamondback moth larvae	lygus bug	tarnished plant bug
Colorado potato beetle	European corn borer	pea aphid	tuber flea beetle

5. When Used: When economic damage is apparent.

Colorado potato beetle: Apply when insects or damage appears. Use the high rate once larvae are past the second instar. Timing of applications should be based on the presence of vulnerable pest developmental stages and significant populations as determined by local monitoring. Colorado potato beetle susceptibility to pyrethroid insecticides should be confirmed using an appropriate assay.

Crucifer flea beetle: To prevent migration of overwintering flea beetle adults throughout the field, ground spray a 15 m strip around the field at the first sign of flea beetle feeding.

Grasshoppers: Best results on young, non-flying grasshoppers (up to 3rd nymphal stage, up to 1 cm in length) or when insect numbers are low. Use higher rate when grasshopper are larger, up to but not including winged adults (up to 2.5 cm in length) or when insect numbers are high. If insect migration into a field is severe, apply a spray to a 15 m strip around the field.

6. How to Apply:

Ground equipment: All registered crops. Do not apply within 15 m of productive fisheries, water or waterfowl habitat.

Aircraft: Matador and Silencer is registered for aerial application on the following crops: alfalfa, barley, canola, corn, flax, mustard, oats, potatoes, sunflower, unimproved pasture, wheat. Matador is also registered for aerial application on summerfallow.

Rate: Use a higher rate for severe infestations, when foliage is dense or when grasshoppers are in the late nymphal or adult stage.

Crop	Insects	mL/ac
Alfalfa ¹	Alfalfa weevil, lygus bug, pea aphid, potato leafhopper, tarnished plant bug	34
Alfalfa, summerfallow ² , unimproved pasture	Grasshoppers	25 - 34
Barley, oats, wheat	Grasshoppers	25 - 34
Beans, dry edible and succulent	Corn borer, cutworms, lygus bugs, potato leafhopper	34

(continued)

Safety information, see page 25

Matador 120EC/Silencer 120EC (cont'd)*(continued)*

Canola, mustard	Bertha armyworm, cabbage seed pod weevil ² , crucifer flea beetle, diamondback moth larvae lygus bug	34
	Grasshoppers	26 - 34
Field corn, forage corn, popcorn, sweet corn	Corn earworm, cutworm, European corn borer, fall armyworm	34
	Grasshoppers	25 - 34
Flax	Cutworms, grasshoppers, pea aphid, pea leaf weevil	34
	Cutworms, pea aphid, potato leafhopper	34
Peas, dry succulent	Potato flea beetle, potato leafhopper, tarnished plant bug, tuber flea beetle	34
	Colorado potato beetle	34 - 51
Potatoes	Sunflower beetle	17 - 26 (ground)
		34 (air)
Chickpeas, fababeans, lentils, soybeans	Refer to label	34

1. Matador and Silencer registered for ground application. Matador only registered for aerial application.

2. Matador only registered for application to summerfallow.

3. Adult stage only, once per season only by ground application.

Water volume: Ground: Use sufficient water for thorough coverage, 100 to 200 L/ha (40 to 80 L/ac).
Air: 4 - 16 L/ac.

- 7. Application Tips:** Control of some insects species with synthetic pyrethroid insecticides decreases as temperature rises. For best results, apply Matador 120EC or Silencer 120EC during early morning before temperature rise and during the evening, past the heat of the day. Temperature must be warm enough for insects to be active.
- 8. How it Works:** Cyhalothrin-lambda is a photostable, synthetic pyrethroid insecticide. It is a fast acting stomach and contact insecticide effective against a broad spectrum of foliar pests. It has no fumigant or systemic activity. Best results will be obtained with Matador 120EC or Silencer 120EC when applied against the early developmental stages of the pest as determined by regular monitoring.
- 9. Grazing, Cropping and Other Restrictions:** Pre-harvest interval (days): Barley, oats, wheat, (28); canola, flax (7); potatoes (7); sunflowers (7). Do not allow livestock to forage treated fields within 14 days of application. Do not graze or feed lactating dairy animals on treated green cereal forage or treated pasture. Do not use more than 2 applications of the high rate on potatoes or 3 applications per year in all other situations.
- 10. Toxicity:** High acute mammalian toxicity. Acute oral LD₅₀ (female rats) Matador 120/Silencer 120 = 278 mg/kg; technical = 56 mg/kg. Skin and eye irritant. Very toxic to fish and other aquatic organisms. This product is toxic to bees and other beneficial insects. Avoid spraying when bees are foraging. Do not re-enter treated areas until 24 hours after treatment. If early re-entry into treated areas is required, workers must wear long pants, long sleeved shirts, chemical resistant gloves, boots and a hat.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store in a cool, well ventilated area away from food or feed and out of the reach of children and animals. Store above 0°C. Storage below 0°C will not impair the effectiveness of Matador 120EC or Silencer 120EC; however following such storage, agitate well before use.

Monitor (methamidophos)

Group 1B

Manufacturer: Bayer CropScience Inc.



Danger Poison

Insecticide

- 1. Formulations:** Liquid; 480 g/L (PCP# 12287); 10 L pail.
- 2. Registered Mixes:** Compatible with most commonly used fungicides.
- 3. Crops:** Canola, potatoes.
- 4. Insects Controlled:**

aphids	Colorado potato beetle	potato flea beetle
Bertha armyworm	grasshoppers	potato leafhopper

5. When Used:

Canola: Bertha armyworm: when larvae number 20 or more /m² and are feeding on pods or flowers; maximum 2 applications per season.

Grasshoppers: Application should begin when migration of grasshoppers from ditches and field borders becomes apparent; maximum 2 applications per season.

Potatoes: Apply in a 10 - 14 day program when necessary.

6. How to Apply:

With: Aircraft or ground equipment.

Rate: Higher rate for severe infestations, adult insects or dense foliage.

Crop	Insects	mL/ac
Canola	Bertha armyworm	233 - 500
	Grasshoppers	500
Potato	Aphids, Colorado potato beetle, potato flea beetle, potato leafhopper	707 - 910

Water volume: Air (canola): 4 L/ac minimum. Ground: 80 - 400 L/ac.

Nozzles: Flat fan recommended.

- 7. Application Tips:** Avoid use during flowering and pollination periods.
- 8. How it Works:** Methamidophos is a broad spectrum, organophosphorus insecticide and acaricide that works by contact and systemic action. Non-phytotoxic when used as directed. Contact effectiveness may persist for 7 - 21 days.
- 9. Grazing, Cropping and Other Restrictions:** Pre-harvest interval (days): canola (10), potatoes (14).
- 10. Toxicity:** High acute mammalian toxicity. Acute oral LD₅₀ (rats) = 95% technical 13 - 15 mg/kg. Monitor = 17 - 20 mg/kg. Extremely toxic to wildlife. Highly toxic to bees exposed to direct treatment or residues on crops. Can cause burns to both skin and eyes.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store and display apart from food or feed. Do not store in or around the home. Store in a cool, dry place but not below -10°C. Protect from heat.

Safety information, see page 25

Movento 240 SC *(spirotetramat)*

Group 23

Manufacturer: Bayer CropScience Inc.

1. **Formulation:** Suspension concentrate; 240 g/L spirotetramat (PCP# 28953); 1 L.
2. **Registered Mixes:** None.
3. **Crops*:** Potatoes.
* See label for complete list of registered crops.
4. **Insects Controlled:** Aphids, psyllids, whiteflies.
5. **When Used:** For best results, treatment should be made when insect populations begin to build and before a damaging population becomes established.
6. **How to Apply:**

With: Ground equipment.

Rate: Rate selected for use should depend on stage of pest development at application and infestation level of those pests. Apply in adequate water for uniform coverage, minimum 300 L/ha by ground. If needed, repeat application at a 7 to 10-day interval.

Movento 240 SC insecticide is subject to phase separation during storage. Vigorous shaking to re-suspend the product is required before using.

Mixing instructions:

1. Fill the spray tank 1/2 full with clean water.
2. Add the required amount of Movento 240 SC insecticide.
3. Fill spray tank to desired level and maintain constant agitation to ensure uniformity of spray mixture.

Crop	Insect	mL/ac
Potato	Aphids	89 - 148
	Psyllids	89 - 148
	Whitefly	89 - 148

Water volume: Ground: Apply in a minimum spray volume of 120 L/ac.

7. Application Tips:

For best results, treatment should be made when insect populations begin to build and before a damaging population becomes established. Rate selected for use should depend on stage of pest development at application and infestation level of those pests. Apply in adequate water for uniform coverage, minimum 300 L/ha by ground. If needed, repeat application at a 7 to 10-day interval.

Minimum interval between applications is 7 days.

Do not exceed a total of 296 mL product per acre per season.

Do not re-enter treated area within 12 hours.

Do not apply this product directly to freshwater habitats.

8. **How it Works:** Following application to plant foliage, Movento 240 SC insecticide is fully systemic, moving through phloem and xylem to all plant tissues including new shoot, leaf and root growth. Movento 240 SC insecticide is active primarily by ingestion by immature insect life stages. Application should be timed to coincide with an early threshold level in developing insect populations.

9. Grazing, Cropping and Other Restrictions:

Pre-harvest interval: Potato 7 days.

Cropping restrictions: A plant-back restriction of 30 days is required for all crops not on the label.

Buffer zones: A buffer zone of 1 metre is required between the point of direct application and the closest downwind edge of sensitive terrestrial habitats (such as grasslands, forested areas, shelter belts, woodlots, hedgerows, riparian areas and shrublands).

10. Toxicity: Acute oral LD₅₀ (female rats) = >2,000 mg/kg.

Acute dermal LD₅₀ (male/female combined rats) = >4,000 mg/kg.

Toxic to aquatic organisms.

To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay. Avoid application when heavy rain is forecast.

Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip between the treated area and the edge of the water body.

This product is **toxic** to bees through direct contamination of pollen and nectar. **Do not** apply this product during crop flowering period or when flowering weeds are present in the field.

This product is **toxic** to certain beneficial insects. Minimize spray drift to reduce harmful effects on beneficial insects in habitats next to the application site, such as hedgerows and woodland.

Toxic to non-target terrestrial plants. Observe specified buffer zones.

11. Precautions, First Aid: Check label for first aid information.

12. Storage: To prevent contamination, store this product away from food or feed. Movento 240 SC insecticide is packaged in poly-ethylene containers. Do not allow product or containers to freeze. Store in a cool, dry place and in such a manner as to prevent cross contamination with other pesticides, fertilizers, food and feed. Store in original container and out of the reach of children, preferably in a locked storage area.

13. Resistance Management: See page 41 for information on resistance management.

Orthene 75% (acephate)

Group 1B

Manufacturer: Arysta LifeScience Canada, Inc.

1. Formulations: Soluble powder; 75% (PCP# 14225).

2. Registered Mixes: None.

3. Crops: Field corn, potato, sweet corn.

4. Insects Controlled:

Colorado potato beetle
European corn borer

green peach aphid
potato aphid

potato flea beetle
potato leafhopper

tarnished plant bug

Insects suppressed: Not applicable.

5. When Used: Begin treatment when eggs or insects first appear.

6. How to Apply:

With: Ground equipment. Do not apply by air.

Orthene 75% (cont'd)**Rate:**

Crop	Insects	g/ac
Field corn, sweet corn	European corn borer	300 - 440
Potato	Green peach aphid, potato aphid, potato flea beetle, potato leafhopper, tarnished plant bug	300 - 440

Water volume: Corn: 90 - 400 L/ac; Potatoes: 90 - 660 L/ac.

- 7. Application Tips:** Do not apply more than four times per season.
- 8. How it Works:** Systemic insecticide: Stomach poison.
- 9. Grazing, Cropping and Other Restrictions:** Preharvest intervals depend on the crop. Do not feed trimmings to livestock or allow animals to graze on treated areas. Do not feed corn fodder or forage from treated crop to livestock. Pre-harvest interval (days): corn (21); potatoes (21).
- 10. Toxicity:** Toxic. Acute oral LD₅₀ (rats) = 605 - 1,100 mg/kg. Toxic to fish and wildlife. Highly toxic to bees.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store in cool, dry place. Protect from excessive heat.
- 13. Resistance Management:** See page 41 for information on resistance management.

Phostoxin (aluminum phosphide)

Restricted Uses

Group 8B

Manufacturer: Abell Pest Control Inc.



Danger Poison

Note: This product is available only to provincially licensed persons.

1. Formulations:

Tablets: (3 g) release 1.0 g phosphine upon decomposition (PCP# 15736).

Pellets: (0.6 g) release 0.2 g phosphine upon decomposition (PCP# 15735).

Sache: (34 g) release 11.0 g phosphine upon decomposition (PCP# 16438).

Order directly – Gastoxin – Garden City Ag. Supplies: 1-888-320-8101; Phostoxin – Garden City Ag. Supplies: 1-888-320-8101; Gardex Chemicals Ltd.: 1-204-989-4790 (Collect).

2. Registered Mixes: None.

3. Crops: Raw agricultural products, grain or feeds.

4. Insects Controlled:

Angoumois grain moth
bean weevil
cadelle
cigarette beetle

dermestids
dried fruit moth
flour beetles
granary weevils

Indian meal moth
khapra beetle
lesser grain borer

Mediterranean flour moth
rusty grain beetle
saw-toothed grain beetle

5. When Used: When the temperature is above 5°C.

Safety information, see page 25

6. How to Apply:

Rate:

Uses	Tablets
Raw agricultural commodities, animal feeds and processed foods	4 - 6/m ³
Commodity temperature °C	Exposure times (days)
Over 20	3
16 - 20	4
12 - 15	5
5 - 11	10
Below 5	Do not fumigate

Note: Suggested exposures should be observed. A shortened exposure period cannot be compensated for by increased dosage.

7. Application Tips:

General: Never fumigate alone. Never fumigate any structure occupied by man or animals or physically adjoining another structure occupied by man or animals. Personnel involved in fumigation must leave the structure within 2 hours of starting fumigation. Person supervising must be a licensed fumigator and personnel assisting must be trained and appropriately licensed in the use of aluminum phosphide.

Fumigating grain storages: Make sure the structure is tight enough to retain the fumigant. Seal the structure as necessary. During fumigation leave all doors, vents, etc. open to create a cross-ventilation in the structure. Tablets may be probed into grain or fed into the grain stream as the grain is transferred from one bin to another. Probing requires a pipe 3 cm in diameter and long enough to reach within 1.5 m of the bottom of the storage. Probes are made in a 1.5 m horizontal grid across the grain surface. Fumigant tablets are dropped down the pipe at 15 cm intervals as the pipe is withdrawn from the grain. The objective is to distribute the tablets as evenly as possible throughout the grain mass. To achieve the proper dosage when treating a stream, apply the tablets uniformly to the grain stream based on flow rate. After application, all openings should be sealed and entries locked and placarded. After the exposure period, open doors and windows for aeration. Remove all warning placards when aeration is complete.

- 8. How it Works:** Phosphine (hydrogen phosphide) is a colourless gas with a carbide-like odour and high volatility. Formulated product consists of aluminium phosphide, ammonium bicarbonate, urea and paraffin. Upon exposure to air, the ammonium bicarbonate breaks down to form ammonia (a pungent, warning gas) and carbon dioxide (a fire suppressant). Within 1 - 4 hours, depending on temperature and humidity, the product begins to decompose and release phosphine. After decomposition, there remains a grey-white dust composed almost entirely of non-poisonous aluminum hydroxide with trace amounts of undecomposed aluminum phosphide. The dust is eliminated when raw agricultural commodities are moved.

Expected results: The effectiveness of this product depends on the fumigation achieved by the release of phosphine gas. Therefore, tightness of the area to be fumigated and temperature of the commodity are essential when determining dosage rates and exposure rates. The tighter the bin and the warmer the temperature of the commodity, the lower the dosage required and vice versa.

- 9. Grazing, Cropping and Other Restrictions:** Aerate finished food for 48 hours before it is offered to the consumer.
- 10. Toxicity:** Hydrogen phosphide gas is very toxic to all forms of animal life, and exposure to even small amounts should be prevented. Poisoning results from ingestion or inhalation as hydrogen phosphide is not absorbed through the skin. It is also insoluble in water, fats and oils.
- 11. Precautions, First Aid:**

Protective equipment: It will be necessary to wear a gas mask if the treated area is entered prior to aeration. It is not necessary to wear a gas mask when product is applied according to label directions. Wear

Phostoxin (cont'd)

gloves of cotton or other breathable material when handling the product. Only open containers in open air and with the opening pointing away from your face. Wash hands after use of the product.

Reduce gas hazards: **Never** let tablets come in direct contact with liquid – this contact causes the immediate release of hydrogen phosphide. **Never** open a container except for immediate usage.

Never confine the product in small gas proof enclosures such as plastic bags. Such confinement could cause the gas concentration to reach the lower flammability level. Take precautions in areas where copper, brass or gold are present, as corrosion may occur. **Never** fumigate in areas containing electronic or telephone equipment, photographic film or copy paper. Remove such items or protect them from exposure to the gas. Hydrogen phosphide has great penetrating power, and gas may slowly seep through concrete block walls. Hydrogen phosphide does not layer, but expands to fill the available space.

Symptoms of poisoning: Severity depends on concentration of hydrogen phosphide involved. **Mild poisoning** results in fatigue, nausea, pressure or pain in the chest, ringing in the ears and uneasiness. Hydrogen phosphide is not a chronic poison, and these symptoms will readily disappear with rest and fresh air. **Greater quantities of gas** produce such symptoms as vomiting, stomach ache, diarrhea, disturbance in equilibrium and dyspnea (difficulty in breathing). Very high concentrations quickly cause bluish-purple skin colour, agitation, poor muscle co-ordination, sub-normal blood oxygen content, unconsciousness and death. Death can occur very quickly or be delayed several days as a result of pulmonary edema and collapse, by paralysis of the central respiratory system. In cases of severe poisoning, disturbance in liver and kidney function can also occur.

First aid: Should exposure to hydrogen phosphide be documented or suspected – remove patient from gas atmosphere to open air. **Call a physician immediately.** Have the patient lie down, keeping him warm and comfortable. Treat as for shock. Make **no** antidotal use of fats, oil, butter or milk. Do **not** administer atropine as it is contraindicated. Begin artificial respiration if breathing has ceased. When exposure to low concentrations of hydrogen phosphide have been documented or suspected, the individual involved should rest for 24 hours, and under no circumstances should he resume any work dealing with fumigation. If ingested, induce vomiting by touching the back of the throat with a blunt object.

12. **Storage:** Tablets are received in resealable flasks. As long as flasks remain intact, the storage life of the product is unlimited. Storage should be in a dry, locked, ventilated area and out of the reach of children and irresponsible persons.

Poncho/Clutch (clothianidin)

Group 4

Manufacturer: Bayer CropScience Inc./Valent Canada Inc.

1. **Formulations:** **Poncho:** Flowable; clothianidin 600 g/L (PCP# 27449); 100 L. **Clutch:** Water dispersable granule 50% (PCP# 29382).
2. **Registered Mixes:** None.
3. **Crops:** **Poncho:** Corn. **Clutch:** Potato*
*See label for complete list of registered crops.
4. **Insects Controlled:** **Poncho 250:** Black cutworm, corn seed maggot, flea beetle, grubs, wireworm.
Poncho 1250: Black cutworm, corn root worm, corn seed maggot, flea beetle, grubs, wireworm. The high rate controls corn root worm and will provide increased protection against wireworms under very high populations.
Clutch: Aphids, colorado potato beetle, leafhoppers.
5. **When Used:** **Poncho:** Seed treatment. **Clutch:** In-furrow application, foliar.

Safety information, see page 25

6. **How to Apply: Poncho:** Available pretreated from corn seed supplier. Seed treated with the low rate is labeled Poncho 250 and seed treated with the higher rate is labeled Poncho 1250.
Rate: Poncho 250: 33 mL per seed unit; Poncho 1250: 167 mL per seed unit.
Clutch: In-furrow application: apply as a narrow band in furrow at planting.
Rate: In-furrow: 108 – 181 g/ac. Foliar: 28 – 43 g/ac.
7. **Application Tips: Poncho:** Available only as pretreated seed.
Clutch: In-furrow: For best results direct spray on the seed pieces or seed potatoes.
Foliar: Use sufficient water volume to ensure optimal uptake and performance.
8. **How it Works:** Clothianidin is a systemic chloronicotinyl insecticide. It protects the seed and developing plant from insect damage.
9. **Grazing, Cropping and Other Restrictions:** Corn, canola and potato may be replanted at any time. A one-year plant back interval is required for leafy, root and tuber vegetables. A 30-day plant back on cereal grains, grasses, non-grass animal feeds, soybean and dried beans is required.
10. **Toxicity:** Acute oral LD₅₀ (rats) = technical >5,000.
11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** Store to prevent cross contamination with other pesticides, fertilizers, food and feed. Store in original container and out of reach of children.

Pounce/Ambush 500EC

(permethrin)

Group 3

Manufacturer: FMC Corporation /United Agri Products Canada Inc. (distributor)/Engage Agro Corporation



Caution Flammable

1. **Formulations: Pounce:** Emulsifiable concentrate; 384 g/L (PCP#16688); 1 L. **Ambush:** Emulsifiable concentrate; 500 g/L (PCP# 14882).
2. **Registered Mixes:** None.
3. **Crops:**

barley	flax	peas	sugar beets
canola	lentils	potatoes	sunflowers
corn	oats	rye	wheat
4. **Insects Controlled:**

army cutworm	crucifer flea beetle	pale western cutworm	red-backed cutworm
Colorado potato beetle	European corn borer	potato flea beetle	tarnished plant bug
corn earworm	fall armyworm	potato leafhopper	
5. **When Used:** Post-planting treatment.
Air: Apply only once per season.
Corn borer, corn earworm: Spray no later than when first feeding damage is seen on foliage.
Cutworms: Applications should be made under warm, moist conditions in the evening or at night when cutworm activity is highest.
6. **How to Apply:**
With: Aircraft or ground equipment.
Rate: Use higher rate for heavy infestations, when adult insects are present, foliage is dense or for cutworms when soil is dry and/or larvae are large.

Safety information, see page 25

Pounce/Ambush 500EC (cont'd)

Crop	Insect	Formulation	mL/ac
*Barley, oats, rye, wheat	Pale western cutworm	Pounce	73 - 158**
		Ambush 500EC	57 - 121**
Canola	Crucifer flea beetle	Pounce	36 - 73
*Canola, corn, flax, lentils, peas, potatoes, sugar beets, sunflowers	Army cutworm, black cutworm, dark-sided cutworm, pale western cutworm, red-backed cutworm	Pounce	73 - 158**
		Ambush 500EC	57 - 121**
Potato	Colorado potato beetle, potato flea beetle, potato leafhopper, tarnished plant bug	Pounce	75 - 110
Sweet corn	Corn earworm, European corn borer	Pounce	111 - 152
	Fall armyworm		73

Notes: * For all crops listed Pounce and Ambush 500EC can be applied up to the 5 leaf stage for cutworm control.

** Where cutworms are large (near full maturity 2.5-4 cm) or soil conditions are dry, the high rates for Pounce and Ambush 500EC are recommended.

Water volume: Corn: 140 - 180 L/ac. Potato: sufficient water for thorough coverage of foliage.

Nozzles: Flat fan recommended.

7. **Application Tips:** Corn: Corn earworm, spray to ensure coverage of ears and silk. European corn borer control, consult with provincial personnel for proper timing of spray. Cutworms: Do not disturb soil surface for 5 days after application.
8. **How it Works:** Works by contact and as a stomach poison on a wide range of pests. No systemic or fumigant activity.
9. **Grazing, Cropping and Other Restrictions:** Cover crop or crop treated with permethrin should not be used as a green feed for animals. Pre-harvest interval (days): corn (1), potatoes (1).
10. **Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) Ambush 500 EC = 3,000 mg/kg, Pounce EC = 1,030 mg/kg. Severe eye irritant. Very toxic to bees and fish. Do not spray when bees are foraging. Spray deposit should be dry before bees begin foraging in treated crops.
11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** Keep product away from fire, open flame, electric light bulbs and other sources of heat. Minimum storage temperature for Ambush 0°C, Pounce -12°C.

Prosper (clothianidin + carbathiin + thiram + metalaxyl)

Insecticide – Fungicide

Group 4 (Insecticide) Group 7,M,4 (Fungicide)

Manufacturer: Bayer CropScience Inc.

1. **Formulations:** Flowable; 120 g/L clothianidin + 56 g/L carbathiin + 120 g/L thiram + 4 g/L metalaxyl (PCP# 27564); 100 L, 1,000 L.
2. **Registered Mixes:** Prosper at 1,250 mL/100 kg seed + Poncho 600 FS at 417 mL/100 kg seed.
3. **Crops:** Canola, rapeseed.
4. **Insects Controlled:** Flea beetles.

Diseases controlled: Seed rot and seedling blight caused by *Alternaria* spp., *Fusarium* spp., *Pythium* spp. and *Rhizoctonia solani*. Seed-borne blackleg.

Safety information, see page 25

5. **When Used:** Seed treatment.
6. **How to Apply:** Available pretreated from canola seed supplier. Prosper must be applied through a closed handling system by commercial applicators.
Rate: 1,250 mL/100 kg of seed.
7. **Application Tips:** Available only as pretreated seed.
8. **How it Works:** Clothianidin is a systemic chloronicotinyl insecticide (Group 4). Prosper will protect up to the 3 to 4 leaf stage of development from flea beetle feeding damage. Carbathiin is a systemic fungicide (Group 7). Thiram is a contact fungicide (Group M). Metalaxyl is a systemic fungicide (Group 4). Fungicides protect seed and developing plant from disease infection.
9. **Grazing, Cropping and Other Restrictions:** Do not use rape greens for human consumption. Corn and canola may be replanted at any time. A one-year plant back interval is required for leafy, root and tuber vegetables. A 30-day plant back on cereal grains, grasses, non-grass animal feeds, soybean and dried beans is required.
10. **Toxicity:** Acute oral LD₅₀ (rats) = formulation >5,000.
11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** Store to prevent cross contamination with other pesticides, fertilizers, food and feed. Store in original container and out of reach of children.

Prosper FX (clothianidin + carbathiin + trifloxystrobin + metalaxyl) Insecticide – Fungicide

Group 4 (Insecticide) Group 4, 7, 11 (Fungicide)

Manufacturer: Bayer CropScience Inc.

1. **Formulations:** Suspension; 285.7 g/L clothianidin + 50 g/L carbathiin + 7.14 g/L trifloxystrobin + 5.36 g/L metalaxyl (PCP# 29159); 100 L, 1,000 L.
2. **Registered Mixes:** None.
3. **Crops:** Canola, rapeseed.
4. **Insects Controlled:** Flea beetles.
Diseases controlled: Seed rot and damping off (pre-emergence and post emergence) caused by *Pythium* spp., *rhizoctonia solani*, *Fusarium* spp. and seed-borne *Alternaria* spp.
Seedling blight caused by *Pythium* spp., *Rhizoctonia solani* and *Fusarium* spp.
Early season root rot caused by *Pythium* spp.
Seed borne blackleg.
5. **When Used:** Seed treatment.
6. **How to Apply:** Available pretreated from canola seed supplier. Prosper FX must be applied through a closed handling system by commercial applicators.
Rate: 1,400 mL/100 kg of seed.
7. **Application Tips:** Available only as pretreated seed.
8. **How it Works:** Prosper FX is a systemic insecticide and fungicide seed treatment. Clothianidin is a systemic chloronicotinyl insecticide (Group 4). Prosper FX provides protection up to the 4 leaf stage of canola and rapeseed. Carbathiin is a systemic fungicide (Group 7). Trifloxystrobin is a systemic fungicide (Group 11). Metalaxyl is a systemic fungicide (Group 4). Fungicides protect seed and emerging seedlings only.

Prosper FX (cont'd)**9. Grazing, Cropping and Other Restrictions:**

Grazing: Do not graze or feed livestock on seeded areas for four weeks after planting.

Re-Cropping: Corn and canola may be replanted at any time. A one-year plant back interval is required for leafy, root and tuber vegetables. A 30-day plant back on cereal grains, grasses, non-grass animal feeds, soybean and dried beans is required.

10. Toxicity: Acute oral LD₅₀ (rats) >5,000 mg/kg. Acute dermal LD₅₀ (rats) >5000 mg/kg.

11. Precautions, First Aid: See label for first aid information.

12. Storage: Store product in original container only. Do not store with other pesticides, fertilizer, food or feed. Do not store Prosper FX at temperatures above 35 degrees Celcius or at low temperatures.

Rimon *(novaluron)*

Group 15

Manufacturer: MANA Canada

1. Formulations: Emulsifiable concentrate; 10% Novaluron.

2. Registered Mixes: None.

3. Crops: Potatoes.

4. Insects Controlled: Colorado potato beetle, European corn borer

5. When Used: Colorado potato beetle: Application should be made when the majority of the population is at egg hatch to the second instar. Use higher application rates and spray volumes for higher pest pressure, when larvae are large or foliage canopy is tall or dense. Reapplication on a 10 - 14 day interval will be required to protect new growth or monitoring indicates that it is necessary.

European corn borer: The first application should be made just prior to egg hatch. Scout for European corn borer to monitor egg-laying and egg hatch to determine application timing. Use higher application rates and spray volumes for higher pest pressure. Reapplication on a 10-14 day interval will be required to protect new growth or monitoring indicates that it is necessary.

6. How to Apply:

With: Ground equipment only. Do not apply more than 2 times per season. **Do not** apply by air.

Rate: 166 - 332 mL/ac.

Water volume: Minimum 40 L/ac.

Pressure: 250 - 300 kPa.

Nozzles: Use hollow cone, disc-core hollow cone or twin jet fan nozzles suitable for insecticide spraying.

Mixing instructions: Prepare solution concentrations in a clean, empty spray tank. Use clean spray filters. Add water to 1/2 level of tank. Add the appropriate amount of Rimon 10 EC to the tank and agitate to ensure proper mixture. Continue filling tank with water until desired dilution is achieved. Shake or re-agitate sprayer before use if application is interrupted. Make up only the amount of application volume as required. Dispose of any unused spray at the end of each day according to the instructions found in the *Storage and Disposal* section of the product label.

7. Application Tips: Apply recommended dosage by conventional ground sprayer equipment capable of delivering sufficient water to obtain thorough, uniform coverage of the target crop. Spray equipment boom and nozzles should be oriented in a manner to minimize boom height to optimize coverage uniformity, maximize deposition and reduce spray drift. Follow-up treatments of Rimon 10 EC should be applied at 10 - 14 day intervals to keep pest populations within threshold limits, if monitoring indicates this is required.

Safety information, see page 25

- 8. How it Works:** Rimon 10 EC is an insect growth regulator (IGR) that must be absorbed by eggs or ingested by insect larvae to be fully effective. Rimon 10 EC is an insecticide for control of listed foliar insect pests on potato and apple. The primary mode of action is by disrupting cuticle formation and deposition occurring when insects change from one developmental stage to another resulting in death at molting. Due to this mode of action, Rimon 10 EC has no effect on adult stages of insects that have completed all the successive molts through larval or nymphal stages of development.
- 9. Grazing, Cropping and Other Restrictions:** Pre-harvest interval (days): Potatoes 14 days. 15 m buffer zone from water must be maintained when applying by ground.
- 10. Toxicity:** **Toxic** to aquatic organisms. Observe buffer zones as specified on the label.
This product may be **toxic** to bee colonies exposed to direct treatment, drift, or residues on flowering crops or weeds. Avoid applying this product to flowering crops or weeds if bees are visiting the treatment area.
Toxic to certain beneficial insects (e.g. predatory mites, parasitoid wasps). Minimize spray drift to reduce harmful effects on beneficial insects in habitats next to the application site such as hedgerows and woodland.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store this product away from feed or food.
- 13. Resistance Management:** See page 41 for information on resistance management.

Ripcord (cypermethrin)

Group 3

Manufacturer: BASF Canada



Warning Poison

- 1. Formulations:** Emulsifiable concentrate; 407 g/L (PCP# 15738); 6 x 1 L pack.
- 2. Registered Mixes:** None.
- 3. Crops:**
Ripcord: Barley, canola, corn, headlands, potatoes, rapeseed, roadsides, summerfallow, strawberry, sunflower, wheat.
- 4. Insects Controlled:**
- | | | | |
|------------------------|---------------------|--------------------|---------------------|
| Bertha armyworm | cutworms | potato flea beetle | sunflower beetle |
| Colorado potato beetle | European corn borer | potato leafhopper | tarnished plant bug |
| corn earworm | flea beetles | strawberry weevil | tuber flea beetle |
| crucifer flea beetle | grasshoppers | | |
- 5. When Used:**
Ground: Do not apply more than 3 times per season.
Air: Canola, sunflowers: once per season. Corn, potatoes: up to 2 times per season.
Apply when insects appear or early signs of insect feeding.
- 6. How to Apply:**
Method: Aircraft or ground equipment.
Cutworms: Ground only.

Ripcord (cont'd)**Rate:**

Crop	Insect	Ripcord mL/ac
Barley, canola, headlands, roadsides, summerfallow, wheat	Grasshoppers	20 - 28 (ground)
Corn	European corn borer	71 (ground and air)
Potatoes	Colorado potato beetle, flea beetle, leafhopper	25 (ground) 50 (air)
	Tarnished plant bug	50 (air)
	Variegated climbing cutworm	70 (ground)
Canola, mustard (canola only)	Bertha armyworm	28 (ground) 36 (air)
	Crucifer flea beetle	—
	Flea beetles	20 (ground)
Barley, corn, seedling potatoes, wheat	Army cutworm, black cutworm, dark-sided cutworm, pale western cutworm, red-backed cutworm, white cutworm	71 (ground)
Strawberry	Strawberry weevil	71 (ground)
	Tarnished plant bug	100 (ground)
Sunflowers	Sunflower beetle, sunflower seed weevil	28 (ground)

Water volume:

Ground: Corn, potatoes, strawberries: 120 - 202 L/ac. Cutworms: 80 - 200 L/ac. Other crops: minimum of 45 L/ac.

Air: Canola (Bertha armyworm), corn (European corn borer), potatoes (Colorado potato beetle, flea beetles, leafhoppers and tarnished plant bug), sunflowers (sunflower beetle): 4.5 - 9.0 L/ac.

Pressure: 250 - 300 kPa.

Nozzles: Flat fan recommended.

7. Application Tips:

Corn: Direct spray to ensure coverage of ears and silk. Consult your local provincial personnel for proper timing of spray.

Grasshoppers: Avoid application when temperatures are above 25°C. Bees: spray mist must be dried before bees begin foraging in treated crop.

Cutworms: Spray under warm, moist conditions and do not disturb the soil surface for at least 5 days.

8. How it Works: By contact and stomach action. Good residual activity. No systemic or fumigant activity.**9. Grazing, Cropping and Other Restrictions:** Pre-harvest interval (days) –

Wheat: 30 days between last treatment and harvest. 21 days after last treatment and harvest for cutworm rate (14 ac/jug).

Barley: 45 days between last treatment and harvest. 21 days after last treatment and harvest for cutworm rate (14 ac/jug).

Canola: 30 days between the last treatment and harvest. 21 days after last treatment and harvest for cutworm rate (14 ac/jug).

Corn: 5 days between last treatment and harvest. 21 days after last treatment and harvest for cutworm rate (14 ac/jug).

Sunflower: 70 days between last treatment and harvest.

Potatoes: 7 days between last treatment and harvest.

Do not graze the treated crops or cut for hay; there are not sufficient data to support such use. 15 m buffer zone from water must be maintained when applying by ground. 100 m buffer zone from water must be maintained when spraying by air.

- 10. Toxicity:** Low-moderate mammalian toxicity. Acute oral LD₅₀ (rats) cypermethrin = 3,200 mg/kg. Ripcord = 542 mg/kg. Very toxic to bees and fish.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store in a heated chemical shed.

Sevin XLR (carbaryl)

Group 1A

Manufacturer: Bayer CropScience Inc./Pascoc Industries Inc.



Warning Poison

- 1. Formulations:** Liquid suspensions; 466 g/L (PCP# 27876); 10 L jug.
- 2. Registered Mixes:** Most formulations are compatible with a wide range of pesticides. Do **not** apply mixes if they are physically incompatible (e.g. curdle or precipitate). Liquid formulations are **not** compatible with diesel fuel, kerosene, fuel oil, aromatic solvents or any Stampede formulation. All formulations are unstable when mixed with alkaline materials such as Bordeaux mixture, lime-sulphur and casein-lime spreaders.

Mixing instructions: Prepare only the required amount of spray on the day of application. Do not store spray mixtures overnight. Agitate, stir or recirculate all carbaryl sprays prior to use.

3. Crops:

alfalfa	clover	non-crop areas	potato	sweet corn
barley	field corn	oats	rangelands	wheat
canola	forage grasses	pastures	rye	

4. Insects Controlled:

alfalfa caterpillar	Colorado potato beetle	flea beetles	stink bug
alfalfa weevil larvae	corn earworm	grasshoppers	sweet clover weevil
armyworm	European corn borer	leafhoppers	tarnished plant bug
blister beetles	fall armyworm	potato flea beetle	webworm

- 5. When Used:** Apply when necessary to prevent economic damage. Do not apply when crops are in bloom.

6. How to Apply:

With: Sevin XLR: aircraft or ground equipment.

Rate: Lower rate on immature insects, light infestations or sparse foliage. Higher rate for adult insects, severe infestations or dense foliage.

Crop	Insect	XLR L/ac
Alfalfa, clover	Alfalfa caterpillar, armyworm, webworm	1.0 - 2.1
	Alfalfa weevil larvae	-
	Blister beetle	1.0 - 1.6
	Climbing cutworm	-
	Leafhoppers	1.0 - 1.6
Barley, oats, rye, wheat	Grasshoppers: nymph	0.5 - 1.0
	adult	1.0 - 1.4

Safety information, see page 25

Sevin XLR (cont'd)

Canola (seedlings only, up to 4 weeks after emergence)	Flea beetles	0.2
Field corn, sweet corn	Corn earworm, European corn borer, fall armyworm	1.0 - 1.6
	Grasshoppers: nymph	0.5 - 1.0
	adult	1.0 - 1.4
Potato	Colorado potato beetle	0.5
	Leafhopper	0.5
	Potato flea beetle	0.5
Ditch banks, field borders, forage grasses, headlands, pastures, rangeland, rights-of-way, wasteland	Grasshoppers (nymphs or sparse vegetation)	0.5 - 1.0
	Grasshoppers (adults or dense vegetation)	1.0 - 1.4

Water volume: Aircraft: 4 L/ac minimum. Ground: 12 L/ac minimum. Sevin XLR applications are more resistant to wash-off when applied as a concentrated suspension. To ensure wash-off resistance, apply dilutions 1 part Sevin XLR to no greater than 39 parts water. Application should be made to dry foliage to maximize wash-off resistance.

All crops: Use sufficient water to obtain thorough and uniform coverage of spray depending on equipment, severity of infestation and stage of crop growth.

Low volume air applications: Hot, dry conditions may cause excessive evaporation of droplets. A higher spray volume per acre may be required under hot, dry conditions and when crop canopies are particularly dense.

Nozzles: Low volume applications: 50-mesh, in-line strainers and 25-mesh, slotted strainers behind the nozzle; cone type nozzles, sizes D6-45 or D8-45.

Note: Flat fan nozzles may be used, but care should be taken as excessive droplet breakup and resulting production of fine droplets may occur. Flat fan nozzles are also prone to plugging under hot, dry conditions.

- 7. Application Tips:** Timing and good coverage are essential for effective control. Calibrate spray equipment to deliver the required volume. Agitate, stir or recirculate all carbaryl formulations prior to use.

Corn: Treat entire plant for larvae in whorls or on foliage. Spray in a 25 - 30 cm band over the row for climbing cutworms. Apply at 2 - 4 day intervals, if necessary, for insects attacking silks and ears; start when first silks appear and continue until silks begin to dry (3 or more applications may be needed).

Alfalfa weevil: If pre-treatment damage is extensive, cut and make application to stubble.

- 8. How it Works:** A carbamate insecticide that works by contact and ingestion. Moderate to rapid in speed of action with moderate to long residual effectiveness (2 days to 4 weeks) depending on crop/pest complex, formulation and climatic conditions.

Expected results: Some immediate control is expected, but the majority of control occurs 24 - 48 hours after application.

Effects of rainfall: Do not apply just before rain.

XLR: Maximum resistance to wash-off is obtained when dilutions are not greater than 1:39 (XLR:water).

Movement in soil: None.

- 9. Grazing, Cropping and Other Restrictions:** Pre-harvest or pre-grazing interval (days): Barley (28), oats, rye, wheat (14); corn (1); potatoes (7). Alfalfa, clovers (2), forage grasses, non-crop areas, pasture, rangeland (1 - 2). Remove cattle from area to be sprayed. Treated forage and feed crops may be fed to dairy animals and animals for slaughter provided sprays are applied as directed. Beef cattle may be re-introduced to range 1 day after application; dairy cattle after 2 days.

- 10. Toxicity:** Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) = 540 mg/kg. Although carbaryl is toxic to honey bees, Sevin XLR has a reduced honey bee hazard warning; do not apply directly to foraging bees.

11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** Do not store where temperature frequently exceeds 38°C. All formulations will withstand freezing.
13. **Resistance Management:** See page 41 for information on resistance management.

Thimet (phorate)

Group 1B

Manufacturer: American Vanguard Corp.



Danger Poison

1. **Formulations:** Granular; 15% (PCP# 10532); 25 kg bag, 20 kg lock and load.
2. **Registered Mixes:** None.
3. **Crops:** Potatoes.
4. **Insects Controlled:**

aphids	leafhopper	thrips
Colorado potato beetle	lygus bug	

Insects suppressed: Potato flea beetle, wireworm.

5. **When Used:** One application at planting time only.
6. **How to Apply:**

With: Granular pesticide applicator.

Rate:

Crop	Insects	Quantity
Potatoes	Aphids, Colorado potato beetle (early season control), leafhopper,	140 g/100 m row (sandy soils)
	leaf miners, psyllids, reduction of potato flea beetle and wireworm damage, tuber flea beetle	215 g/100 m row (slit to clay soils)

7. **Application Tips:** Beans: distribute in the row to the side of the seed. Potatoes: distribute evenly in the furrow on each side of the row. Do not place in direct contact with the seed. Do not use in muck soils. Do not apply to any area not specified on the label. Do not apply later than at planting time of potatoes.
8. **How it Works:** A systemic, organophosphorus insecticide with effective initial residual activity against soil insects and other arthropods.

Expected results: Only early season control of Colorado potato beetle. Reduction of potato flea beetle and wireworm damage.

Effects of rainfall: Relatively insoluble in water, therefore, the effect of normal rainfall is not appreciable.

Movement in soil: Relatively insoluble, therefore, movement is not appreciable.
9. **Grazing, Cropping and Other Restrictions:** Do not feed treated foliage within 60 days of treatment.
10. **Toxicity:** High acute mammalian toxicity. Acute oral LD₅₀ (rats) = 2 - 4 mg/kg. Acute dermal LD₅₀ (rabbits) = 226 mg/kg. Highly toxic to fish, birds and other animals. Birds consuming granules may be killed. Poisonous by skin contact, inhalation or swallowing. Repeated inhalation or skin contact may, without symptoms, progressively increase susceptibility to poisoning.
11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** Do not use or store in or around the home. Must be stored or displayed **away** from food and feed. Store open bags in labelled, sealed drums or heavy plastic bags.

Thiodan/Thionex EC (endosulfan)

Group 2A

Manufacturer: United Agri Products Canada Inc.



Danger Poison

- 1. Formulations:** Emulsifiable concentrate; 400 g/L; 10 L container. Wettable powder; 50%; 2 kg bag.
Thiodan (PCP# 15747). Thionex EC (PCP# 23453).
- 2. Registered Mixes:** Endosulfan is compatible with most insecticides and fungicides except Bordeaux mixture, hydrated lime, calcium arsenate or zinc sulphate.
- Mixing instructions:** Wettable powder: fill spray tank nearly full and either pour recommended amount on water surface or pre-mix powder in a bucket 1/2 filled with water, then pour mix through screen into nearly filled spray tank. Finish filling tank. Keep agitator running during filling and spraying.

3. Crops:

alfalfa	canning peas	field corn	seed peas	sunflowers
beans (except lima)	clover	potatoes	sugar beets	sweet corn

4. Insects Controlled:

aphids	corn leaf aphid	pea weevil	spittle bug
beet webworm	green peach aphid	potato aphid	sunflower beetle
black bean aphid	leafhoppers	potato flea beetle	tarnished plant bug
Colorado potato beetle	pea aphid	potato leafhopper	tuber flea beetle
corn earworm			

- 5. When Used:** Repeat as necessary unless directed otherwise.

Alfalfa, clover: Apply soon after spittle bug eggs hatch. Do not apply when bees are present.

Corn, peas: Do not apply more than twice per season. Apply to peas only if crop is to be harvested by combine.

Sugar beets, sunflowers: Do not apply more than once per season.

Sunflower beetle: Economic threshold – 1 - 2 adults/seedling or 10 - 15 larvae/plant causing 25% defoliation on the upper 8 - 12 leaves.

6. How to Apply:

With: Ground equipment only.

Rate: Lower rate for young insects (larvae), light infestations or sparse foliage.

Crop	Insect	EC/WP	Quantity/ac
Alfalfa, clover	Spittle bugs	EC	0.3 L/ac
Beans (except lima)	Black bean aphid, green clover worm, Mexican bean beetle, potato leafhopper	EC	0.6 L/ac
		WP	445 - 605 g/ac
Canning peas	Pea aphid, pea weevil	EC	0.6 - 0.8 L/ac
		WP	445 - 710 g/ac
Field corn, sweet corn	Corn earworm	EC	1.1 - 1.7 L/ac
	Corn leaf aphid	EC	1.1 L/ac
Potatoes	Aphids, Colorado potato beetle, potato flea beetle, potato leafhopper, tuber flea beetle	EC	0.6 L/ac
		WP	445 g/ac
	Tarnished plant bug	EC	0.8 L/ac
		WP	605 - 710 g/ac

Thiodan/Thionex EC (cont'd)

Sugar beets	Beet webworm	EC	1.1 L/ac
	Green peach aphid	EC	0.8 L/ac
Sunflower	Sunflower beetle	EC	0.6 L/ac

Water volume: Thorough wetting of all plant parts is essential for good results.

Nozzles: Flat fan recommended.

- 7. Application Tips:** Apply during late evening. Spray upper and lower leaf surfaces. Prevent sprays or dusts from drifting to areas occupied by people or animals.
- 8. How it Works:** A non-systemic, organochloride insecticide/acaricide with both contact and stomach action.
- 9. Grazing, Cropping and Other Restrictions:** Pre-harvest intervals (days): alfalfa (30), beans (2), corn (50), clover (30), peas (7), potatoes (1), sugar beets (45), sunflower (60). Do not feed alfalfa or clover forage within 30 days of application. Do not feed treated bean threshings or crop refuse to livestock. Do not feed fresh, dry or ensiled pea vines and pea pods to any livestock or allow grazing in treated fields. Do not feed treated sugar beet foliage to livestock; however, roots may be fed. Do not feed treated sunflower foliage to livestock.
- Succeeding crops:** Do not apply to crops that are to be followed by a root crop other than carrots, potatoes, sweet potatoes or sugar beets.
- 10. Toxicity:** High acute mammalian toxicity. Acute oral LD₅₀ (rats) = technical 80 - 110 mg/kg. Toxic to bees. Highly toxic to fish. Moderately toxic to birds and mammals. Do not contaminate streams or lakes.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Do not store E.C. below -7°C.

Titan ST Insecticide (clothianidin)

Group 4

Manufacturer: Bayer CropScience Inc.

- 1. Formulations:** Suspension; 48% clothianidin(PCP# 27449); 1 L, 3.8 L, 10 L, 200 L, 1,000 L.
- 2. Registered Mixes:** None.
- 3. Crops:** Potatoes – seed piece treatment.
- 4. Insects Controlled:** Wireworm suppression.
Wireworm species suppressed: *Agriotes obscurus*, *A. lineatus*, *Limonius agonus*, *Melanotus* spp., *M. communis*. May reduce damage caused by other wireworm species.
- 5. When Used:** One application at planting time only.
- 6. How to Apply:**
With: Apply using appropriate seed piece treater designed for treating potatoes.
Rate: 20.8 mL of Titan ST / 100 KG potato seed pieces.
- 7. Application Tips:** Apply only in areas with adequate ventilation or in areas that are equipped to remove spray mist or dust. Apply specified dosage as diluted spray onto seed pieces using a shielded spray system that is well contained and will prevent the loss of any liquid. Plant seed pieces as soon as possible after cutting and treating.
- 8. How it Works:** Titan ST insecticide affects the nervous system through ingestion for suppression of wireworm damage.

Titan ST Insecticide (cont'd)

- 9. Grazing, Cropping and Other Restrictions:** Do not apply any subsequent application of a Group 4 insecticide following Titan ST as a potato seed piece treatment. Do not use treated seed for food, feed or oil processing.

Re-cropping: Corn, canola and potatoes may be replanted at any time. A twelve month interval is required for leafy, root and tuber vegetables (except potatoes). A 30 day plantback interval is required for cereal grains, grasses, nongrass animal feeds, soybeans and dried beans.

- 10. Toxicity:** Acute oral LD_{50} (rats) = 2,000 mg/kg. Acute dermal LD_{50} >4,000 mg/kg.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store in a cool place. Do not store in direct sunlight. Protect from freezing temperatures.

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Chemical Control of Plant Diseases in Alberta

Introduction

Plants, like other living organisms, are attacked by many diseases that are caused by fungi, bacteria, viruses, mycoplasmas and nematodes. The management of plant diseases is based on four general parameters:

- **Exclusion** or quarantine, i.e. prevention of a disease organism or diseased plant material from entering a country or disease-free area where the disease could become established.
- **Protection** whereby proper sanitation practices, chemical controls, adequate soil nutrient levels and good soil drainage may be used to protect plants from disease organisms.
- **Eradication** involving the use of crop rotations or the application of eradicant chemicals such as fungicides.
- **Plant breeding** whereby crop plants are selected for partial or complete resistance to a specific disease or range of infectious diseases.

Chemical control of disease

In Alberta, fungal diseases of some field crops may be subject to direct chemical control by fungicides. Control of most other field crop diseases relies on alternate methods. The major use of fungicides in these crops, at present, is in the treatment of seeds (cereal, forage, oilseed) and potato seed pieces. This situation may change in the near future as grain growers move to adopt more intensive crop management strategies in an attempt to increase profit margins.

At present, foliar fungicides are registered for Sclerotinia white mold, alternaria black spot and blackleg control in canola, cereal leaf diseases, field beans, lentils and foliar diseases of potatoes. For convenience, dual purpose treatments with the insecticide diazinon, used in seed-treatment formulations, have been included in this chapter on fungicides. For principles and procedures involving the use of plant disease control chemicals, follow the information outlined in the first section of this guide.

Seed Treatment of Cereal, Forage, Oilseed and Pulse Crops

Purpose of seed treatment

Seed treatment provides economical insurance against many diseases and some insect pests of seed and seedlings. Chemical treatment can give seedlings a head start by preventing or reducing damage resulting from certain crop pests.

Diseases are controlled by contact fungicides that destroy fungi carried on the seed, such as common bunt of wheat, the surface-borne smuts of barley and oats, fungus stripe of barley, and some leaf-spotting and seed decay fungi. Systemic fungicides destroy fungi carried in the seed, such as loose smut of wheat and barley, and they protect the early growth of the seedling.

Specific recommendations:

- Rye and flax should be treated because they are very susceptible to seed decay.
- Winter wheat should be treated to prevent bunt and seed decay as well as to promote good seedling growth.
- If bunt or smut was observed in a crop that will be used for seed, the grain should be treated. If a variety is grown that is susceptible to bunt or smut and the presence of the disease is uncertain, it may be wise to treat the seed annually or every second year, depending on the susceptibility of the variety.
- Canola should always be treated to control the seed-borne phase of blackleg.
- Alfalfa seed is treated to control verticillium wilt.

Insecticidal seed treatment will prevent or reduce damage caused by certain crop pests.

- Crops on newly-broken land or cereals on fields with previous wireworm damage should always be treated. However, Cruiser is the only seed treatment which has some effect on wireworms. If wireworms are a serious problem, you should treat your cereal seed annually.

Methods of seed treatment

Custom treatment

Fungicides are applied to the seed sometime before planting. Seed cleaning plants are equipped to treat seed with liquid fungicides. Canola can only be treated by custom applicators as there is no farmer applied seed fungicides available. Farmers can use a variety of methods for both liquid and dry formulation application.

Drill box treatment

Seed is treated directly in the drill box. Fungicides and seed are layered and then mixed thoroughly. This technique avoids the problem of storing treated seed or treating more seed than necessary for planting. Use protective gloves, clothing and breathing equipment for this operation.

Precautions

- **read** and **follow** label directions carefully
- **treated** seed must not be allowed to contaminate grain intended for food, feed or commercial use
- **bury** leftover treated seed or store it safely in labelled bags for future use as seed
- **treated** seed offered for sale must be labelled with the name of the treated chemicals (*Canada Seed Act*)
- **treated** seed in transit must be bagged or bulk loads tarped to prevent spillage (*Alberta Act*)

Fungicide Group Classification by Mode of Action

Mode of action	Chemical family	Active ingredients	Found in
Group 1			
Inhibition of tubulin formation.	Benzimidazole	thiabendazole thiophanate-methyl	Crown, Mertect SC DCT*, Senator 70WP, Senator PSPT
Group 2			
Affect DNA and RNA synthesis & metabolism.	Dicarboximides	iprodione	Rovral Flo, Rovral RX
Group 3			
Demethylation inhibitors.	Triazoles (includes conazoles)	difenoconazole ipconazole propiconazole prothioconazole tebuconazole triticonazole	Dividend XL RTA, Helix*, Helix XTra* Rancona Apex Bumper 418 EC, Pivot 418 EC, Quilt, Stratego 250 EC, Tilt 250E Proline Folicur 432 F, Raxil MD, Raxil T Charter, Charter RTU, Gemini
Group 4			
Phenylamides. Affects RNA synthesis.	Acylamides	metalaxyl metalaxyl-M	Allegiance FL, Apron FL, Apron Maxx RTA, Bravo 500, Prosper*, Raxil MD, Ridomil Gold, Ridomil Gold MZ 68WP Trilex AL Dividend XL RTA, Helix*, Helix XTra*
Group 5			
Morpholines inhibition of an isomerase in sterol biosynthesis.	Morpholines	dimethomorph	Acrobat 50 WP
Group 7			
Oxathiin. Affect mitochondrial transport chain.	Anilide (oxathiin)	boscalid carbathiin	Headline Duo, Lance Crown, Gaucho 480*, Gaucho CS FL*, Prosper*, Vitaflo 280
Group 9			
	Pyrimidine	pyrimethanil	Scala
Group 11			
Strobilurin type action and resistance. Inhibit mitochondrial respiration.	Oxazole Strobilurin	famoxadone azoxystrobin fenamidone pyraclostrobin trifloxystrobin	Tanos 50 DF Quadris, Quilt Reason 500 SC Headline Duo, Headline EC Stratego 250 EC, Trilex AL
Group 12			
Phenylpyrroles.	Phenylpyrroles	fludioxonil	Apron Maxx RTA, Helix*, Helix XTra*, Maxim MZ PSP, Maxim PSP

(continued)

Safety information, see page 25

Fungicide Group Classification by Mode of Action

Mode of action	Chemical family	Active ingredients	Found in
Group 21	Imidazole	cyazofamid	Ranman
Group 22		zoxamide	Gavel 75 DF
Group 29	pyridine	fluazinum	Allegro 500F
Group 40	Amide Fungicide	mandipropamid	Revus
Group M			
Multi-site activity.	Chloronitrile	chlorothalonil	Bravo 500, Ridomil Gold, Tattoo C
	Dithiocarbamates	mancozeb	Dithane DG 75, Gavel 75 DF, MancoPlus, Maxim MZ PSP, Manzate 200/75DF/Pro-stick, Penncozeb 75DF/80WP, Potato Seed Treatment, Ridomil Gold MZ 68WP, Tuberseal
		maneb	D-B Red L, Dithane M-22
		metiram	Polyram 16D, Polyram DF
		thiram	Gauche 480*, Gauche CS FL*, Gemini, Prosper*, Raxil T, Thiram 75WP, Vitaflo 280
	Inorganic	copper	Copper 53W, Copper Spray
		copper hydroxide	Kocide 2000, Parasol
	Phthalimide	captan	Agrox B-2*, Agrox CD*, Captan Flowable, DCT*
		sulfur	Kumulus DF
Group U			
Unclassified.	Acetimide	cymoxanil	Curzate 60 DF, Tanos 50 DF
	Carbamate	propamocarb-hydrochloride	Tattoo C

* Contains fungicide and insecticide combination.

Agrox B-2/Agrox CD *(diazinon + captan)*

Fungicide – Insecticide

Group 1B (Insecticide) Group M (Fungicide)

Manufacturer: Norac Concepts Inc.



Danger Poison

1. Formulations:

Seed treatment: Powders; **Agrox B-2:** 11% diazinon + 33.5% captan (PCP# 26956); 2 kg container.
Agrox CD: 15% diazinon + 15% captan (PCP# 26957); 200 g and 600 g tube.

2. Registered Mixes: Use this product only on seed previously treated with captan or thiram. Do not use on seed already treated with an insecticide (other than methoxychlor or malathion).**3. Crops:** Beans, corn, peas, soybeans.**4. Diseases Controlled:** Captan in this formulation supplements previous fungicide treatment for seedling blight and seed rot.

Insects controlled: Root maggots, seed maggots.

5. When Used: At planting time.**6. How to Apply:**

With: Protective equipment, using standard dry seed treatment methodology described. Agrox B-2 may be made into a slurry for application onto seed. Read label for specific mixing instructions.

Drill box treatment: At the start, treat enough seed in a separate container to cover bottom of empty drill box. Mix product and seed thoroughly until seed is a uniform colour using the following mixing method (**Do not** mix with hands):

1. Place and level 1/2 of the seed in drill box and sprinkle 1/2 of the required amount of product uniformly over seeds. Mix thoroughly with a paddle. Fill box with seed and sprinkle remaining 1/2 of product over seed, mix again. Thoroughly mix with a paddle when drillbox is 1/2 full and again when full.

Rate:

Crop	Disease	Insect	Agrox B-2 mL/25 kg seed	Agrox CD mL/25 kg seed
Corn	Seed rot, seedling blight	Seed corn maggots	85	50
Beans (all)	Seed rot, seedling blight	Seed corn maggots	80	50
Peas	Seed rot, seedling blight	Seed corn maggots	80	50
Soybean	Seed rot, seedling blight	Seed corn maggots	80	50

7. Application Tips: Treat only the amount of seed to be sown to avoid the problem of storing treated seed.**8. How it Works:** A protective seed treatment for the control of seedling diseases and the control of soil insects.**9. Grazing and Harvest Restrictions:** Do not use treated seed for food, feed or oil processing.**10. Toxicity:** Oral LD₅₀ (rats) captan = 8,400 - 15,000 mg/kg, diazinon = 300 mg/kg.**11. Precautions, First Aid:** Check label for first aid information.

12. Storage: Store in cool, dry place away from food or feed. Keep container closed when not in use. Keep away from fire and sparks. Stored treated grain should be labelled: **"Do not use for food or feed. This seed has been treated with Agrox CD. Poisonous to man and animals. Keep out of reach of children."**

Apron FL/Allegiance FL

(metalaxyl)

For Commercial Seed Treaters Only

Group 4

Manufacturer: Bayer CropScience Inc.

- 1. Formulations:** Water-based liquid suspension; 317 g/L. **Apron:** 3.78 L (PCP# 24262). **Allegiance:** 3.78 L (PCP# 26674).
- 2. Registered Mixes:** Apron FL may be applied to seed treated with Vitaflo 280, Crown or Thiram 75WP to provide a broader spectrum of disease control.
- 3. Crops:** Alfalfa, barley, beans, birds-foot trefoil, canola, chickpeas, clover, field corn, forage grasses, low tannin lentils, oats, peas, rapeseed, rye, sainfoin, seed millet, sorghum, soybeans, sugar beets, sunflowers, sweet corn, turf grasses, vetch, wheat.
- 4. Diseases Controlled:** Seed rots and seedling blights caused by Pythium species. Early season Phytophthora in soybeans and downy mildew in corn, peas, sunflower.
- 5. When Used:** Apply as a seed treatment prior to planting. Apron FL/Allegiance FL is sold only to commercial seed treaters who can comply with regulations pertaining to colouration of treated seed enforced under the *Seeds Act*.
- 6. How to Apply:**

With: Accurate seed treating equipment. Consult Bayer CropScience for information on seed treating equipment, calibration and use of colourants. Seed quality should be checked before committing a seed lot to chemical treatment. Avoid treating mechanically-damaged seed.

Rate: Apron FL/Allegiance FL should be mixed with water to form a slurry seed treatment.

Crop	Apron FL/Allegiance FL mL/100 kg seed	Water mL	Total volume mL
Alfalfa, beans, clover, field corn, sainfoin, sweet corn, vetch	46 - 110	454 - 390	500
Canola, processing peas, rapeseed	32 - 110	484 - 390	500
Chickpeas, dry peas	16 - 110	484 - 390	500
Forage grasses, soybeans	46 - 93	454 - 407	500
Low tannin lentils	16	484	500
Sugar beets, turf grasses	93	407	500
Sunflowers	110 - 189*	390 - 311	500

* High rate needed for downy mildew control.

Note: A suitable seed colourant such as Gustafson Pro-Ized Seed Colourant must be added to the slurry prior to application on seed. Follow instructions on the colourant package for mixing with the Apron FL slurry.

- 7. Application Tips:** Use only recommended rates.
- 8. How it Works:** Metalaxyl is a systemic fungicide that is absorbed into the germinating seed and is transported through the growing seedling, providing control of seed and seedling diseases.
- 9. Grazing and Harvest Restrictions:** Do not graze or feed livestock on crops grown from treated seed for four weeks after planting.
- 10. Toxicity:** Low mammalian toxicity value. Acute oral LD₅₀ (rats) product = 2,900 mg/kg. Mild skin irritant.

Apron FL/Allegiance FL (cont'd)

- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store product in original container only, away from other pesticides, fertilizer, food or feed. Keep container closed.
- 13. Resistance Management:** See page 41 for information on resistance management.

Apron Maxx RTA

(fludioxonil + metalaxyl-M)

Group 4, 12

Manufacturer: Syngenta Crop Protection Canada Inc.



WARNING POISON

- 1. Formulations:** 0.73% fludioxonil + 1.1% metalaxyl-M (PCP# 27577); 2 x 10 L jugs, 55 L keg, 115 L tote.
- 2. Registered Mixes:** None.
- 3. Crops:** Chickpeas, dry beans, field peas, lentils, lupins, succulent peas, soybeans.
- 4. Diseases Controlled:** Damping-off, seed rots, seed-borne anthracnose, seed-borne ascochyta blight (caused by *Ascochyta Rabiei*), seedling blight (see table for complete listing by crop).
- 5. When Used:** Treat seed prior to or just before seeding.
- 6. How to Apply:** Apron Maxx RTA can be applied on farm or commercially. Can be applied with any standard seed treatment equipment designed for water based products and the seed being treated. Equipment must accurately meter the seed and rate of Apron Maxx to ensure proper application of the fungicide to the seed. Apron Maxx RTA may be used with treat-on-the-go air seeders. Contact Syngenta for proper applications with these treaters. Uneven seed coverage may not provide the desired level of disease control.

Rate: 325 ml/100 kg of seed.

Crop	Disease	mL/100 kg seed
Chickpeas	Control of seed rot, pre-emergence and post-emergence damping-off caused by – <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp. and <i>Pythium</i> spp.	325
	Seed rot and seedling blight caused by – seed-borne <i>Botrytis</i> spp.	
	Seed-borne <i>Ascochyta</i> blight caused by – <i>Ascochyta Rabiei</i>	
Dry beans (cranberry beans, dark red kidney beans, light red kidney beans, white beans)	Damping-off caused by – <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp. and <i>Pythium</i> spp.	325
	Anthracnose caused by – seed-borne <i>Colletotrichum</i> spp.	
Lentils	Control of seed rot, pre-emergence and post-emergence damping-off caused by – <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp. and <i>Pythium</i> spp.	325
	Seed rot and seedling blight caused by – seed-borne <i>Botrytis</i> spp.	
	Seed-borne <i>Ascochyta</i> blight caused by – <i>Ascochyta Rabiei</i>	
Peas (both field and succulent)	Control of seed rot, seedling blight, pre-emergence and post-emergence damping-off caused by – <i>Fusarium</i> spp., <i>Rhizoctonia</i> spp. and <i>Pythium</i> spp.	325

(continued)

Safety information, see page 25

Crop	Disease	(continued)
		mL/100 kg seed
Soybeans	Damping-off and seed rots caused by – <i>Pythium</i> spp., <i>Fusarium</i> spp. and <i>Rhizoctonia</i> spp.	325
	Seed rot and seedling blight caused by – seed-borne <i>Phomopsis</i> spp.	
	Early season root rot caused by <i>Phytophthora megasperma</i> var. <i>sojae</i> .	

7. **Application Tips:** Apron Maxx RTA can be used with some rhizobium based inoculants. Contact inoculant manufacturer for proper recommendations. Treated seed may not flow at the same rates through seeding equipment as untreated seed. With rough coated seed, the addition of water to Apron Maxx will increase coverage; contact Syngenta Crop Protection for more information. Uniform coverage is important to obtain optimum results.
8. **How it Works:** Apron Maxx RTA is a ready to apply water based seed treatment that controls certain seed and soil-borne diseases of peas, lentils, chickpeas, dry beans and soybeans.
9. **Grazing and Harvest Restrictions:** Do not plant any crop other than chickpeas, dry beans, lentils, peas and soybeans within 30 days to fields where treated seeds were planted.
10. **Toxicity:** Product is toxic to fish and other aquatic organisms. Do not apply directly to aquatic habitats. Do not contaminate water by cleaning of equipment or disposal of wastes. Treated seed should be incorporated into the soil.
11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** Ideal storage conditions are between freezing and 30°C.

Captan Flowable (captan)

Group M

Manufacturer: Norac Concepts Inc.

1. **Formulations:** Flowable; 30% (PCP# 24684); 20 L container.
2. **Registered Mixes:** None.
3. **Crops:** Dry beans, field corn, lima beans, peas, snap beans, soybeans, sugar beets, sweet corn.
4. **Diseases Controlled:** Damping off, root rot, seed decay, seedling blight.
5. **When Used:** A seed treatment in the slurry method applied prior to seeding.
6. **How to Apply:**

With: Protective equipment, using standard seed treatment methodology described.

Slurry method: Apply in slurry treater equipment with the amount of water required. Seed treated by this method should be dried before bagging.

Rate:

Crop	Disease	30% Captan FL mL/25 kg seed
Bean, pea, soybean	Damping off, root rot, seed decay, seedling blight	70
Field corn	Damping off, root rot, seed decay, seedling blight	30 - 50
Sugar beet	Damping off, root rot, seed decay, seedling blight	155
Sweet corn	Damping off, root rot, seed decay, seedling blight	60 - 85

* This rate is to be applied only by a professional applicator to ensure complete and uniform coverage.

Safety information, see page 25

Captan Flowable (cont'd)

7. **Application Tips:** None.
8. **How it Works:** A protective seed treatment for the control of seed and seedling diseases.
9. **Grazing and Harvest Restrictions:** Do not feed treated seed to livestock. Do not expose treated seed to birds and other wildlife.
10. **Toxicity:** Low mammalian toxicity. Captain LD_{50} (rats) = 8,400 mg/kg.
11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** In cool, dry place away from flammable materials and sources of heat and flame and away from foodstuffs. Stored, treated grain should be labelled: **"Do not use for food or feed. This seed has been treated with captan."**

Charter (*triticonazole*)

Manufacturer: BASF Canada

Group 3



CAUTION POISON

1. **Formulations:** 25g/L triticonazole FS (PCP# 26455); 2 x 10 L (one 10 L jug contains 6.2 L Charter), 200 L (contains 133.4 L Charter).

2. **Registered Mixes:** None.

3. **Crops:** Barley, oats, wheat.

4. **Diseases Controlled:**

Barley: Covered smut, false loose smut, true loose smut, seed rot (*Fusarium* spp.), seedling blight caused by seed-borne *Fusarium* spp. Suppression of common root rot, seedling blight caused by *Cochliobolus* sp., suppression of *Fusarium* crown and root rot.

Oats: Covered smut, loose smut. Seedling blight caused by *Fusarium* spp., seedling blight caused by seed borne *Fusarium* spp. Seed rot caused by *Fusarium* spp. Suppression of *Fusarium* crown and root rot, common root rot, seedling blight caused by *Cochliobolus sativus*.

Wheat: Common bunt, loose smut, seed rot (*Fusarium* spp.), seedling blight caused by seed-borne *Fusarium* spp. Suppression of common root rot, seedling blight caused by *Cochliobolus* sp., suppression of *Fusarium* crown and root rot.

5. **When Used:** Treat seed prior to or at seeding.

6. **How to Apply:** Seed should be well conditioned and cleaned before treating with Charter. Treated seed should not require drying after treatment and can be stored or bagged immediately. Uniform seed coverage is required for good disease control. To ensure adequate seed coverage, add Charter to seed slowly in a calibrated treating equipment system to ensure proper rates. Thoroughly mix the recommended amount of Charter into the required amount of water for the treated seed, and follow manufacturer's instructions for the seed treating equipment being used.

With: Charter can be applied in commercial seed treatment plants and for use in on-farm standard gravity flow or mist-type treatment machines. Charter can also be used in on-the-go air seeder treatment systems.

Water volume: Charter requires the addition of water for application. When using the Flexi-Coil "On-the-Go" Seed Treatment Unit, Charter should be diluted with 2 parts water (12.4 L) to 1 part Charter (6.2 L) water to reach 60 mL/10 kg of seed. One 40 L tank will hold 1 case (2 x 6.2 L jugs) in a 2:1 dilution for a total volume of 37.2 L.

Rate: 200 mL concentrate/100 kg seed (300 mL diluted product/100 kg of seed).

Mixing instructions: When using 200 mL/100 kg for wheat, barley and oats seed, Charter must be diluted with water to provide adequate application volume to ensure good coverage of seed and mix thoroughly. For best results, add 2 parts Charter and 1 part water for wheat, barley and oats. Dye is no longer required for the jugs of Charter. For the drums, the addition of the Polymer Red is required, which is packaged separately.

Container size	Bushels treated		
	Barley*	Oats**	Wheat***
6.2 L jug of concentrate	142	201	114
133.4 L drum of concentrate	3,064	4,325	2,451

* Based on 48 lbs/bu

** Based on 34 lbs/bu

*** Based on 60 lbs/bu

Important: Recommended dilution is 2 parts Charter to 1 part water for wheat, barley and oats.

7. **Application Tips:** Uniform coverage is important to obtain optimum disease control.
8. **How it Works:** Charter is a systemic seed treatment that controls certain seed-borne diseases. The active ingredient triticonazole is a triazole fungicide that provides systemic, broad spectrum protection against seed- and soil-borne diseases.
9. **Grazing and Harvest Restrictions:** Do not use treated seed for food, feed or oil processing. Do not feed treated seed, or otherwise expose, to wildlife or domestic birds. Do not store treated seed for more than 18 months.
10. **Toxicity:** Acute oral = >5,000 mg/kg rats, Acute dermal = >2,000 mg/kg rabbits. Tested as mildly irritating to the eye. Tested as slightly irritating to the skin (rabbits). Do not feed treated seed or otherwise expose wildlife or domestic birds. If treated seed is spilled outdoors or in areas accessible to birds, promptly clean up or bury to prevent ingestion. **Do not** contaminate domestic or irrigation water supplies, lakes, streams, ponds or any other body of water.
11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** Protect from frost and freezing. Do not store Charter seed treatment fungicide near feed or foodstuffs.
13. **Resistance Management:** See page 41 for information on resistance management.

Charter RTU (triticonazole)

Group 3

Manufacturer: BASF Canada

1. **Formulations:** 16.8 g/L triticonazole formulated as a liquid flowable seed treatment. Container size: 9.3 L and 200 L drums.
2. **Registered Mixes:** None.
3. **Crops:** Barley, oats, wheat.
4. **Diseases Controlled:**
Barley: Covered smut, false loose smut, true loose smut, seed rot (*Fusarium* spp.), seedling blight caused by seed-borne *Fusarium* spp. Suppression of common root rot, seedling blight caused by *Cochliobolus* sp., suppression of *Fusarium* crown and root rot.

Safety information, see page 25

Charter RTU (cont'd)

Oats: Covered smut, loose smut. Seedling blight caused by *Fusarium* spp., seedling blight caused by seed borne *Fusarium* spp. Seed rot caused by *Fusarium* spp. Suppression of *Fusarium* crown and root rot, common root rot, seedling blight caused by *Cochliobolus sativus*.

Wheat: Common bunt, loose smut, seed rot (*Fusarium* spp.), seedling blight caused by seed-borne *Fusarium* spp. Suppression of common root rot, seedling blight caused by *Cochliobolus* sp., suppression of *Fusarium* crown and root rot.

5. When Used: Treat seed prior to or at seeding.

6. How to Apply: Seed should be well conditioned and cleaned before treating with Charter RTU. Treated seed should not require drying after treatment and can be stored or bagged immediately. Uniform seed coverage is required for good disease control. To ensure adequate seed coverage, add Charter RTU to seed slowly in a calibrated treating equipment system to ensure proper rates.

With: Charter RTU is a ready-to-use seed treatment formulation for use in commercial seed plants, in on-farm standard gravity flow or mist type treatment machines, and in on-the-go air seeder treatment systems.

Water volume: Charter RTU is a ready-to-use formulation and no additional water is required. Consult the seed treatment application equipment manufacturer for specific application instructions for use of various seed treatment application machines.

Rate: 300 mL concentrate/100 kg seed

Mixing instructions: Charter RTU is a ready-to-use formulation. No water or dye needs to be added.

Container size	Bushels treated		
	Barley*	Oats**	Wheat***
9.3 L	142	201	114
200 L	3,064	4,325	2,451

* Based on 48 lbs/bu

** Based on 34 lbs/bu

*** Based on 60 lbs/bu

7. Application Tips: Uniform coverage is important to obtain optimum disease control.

8. How it Works: Charter RTU is a systemic seed treatment that controls certain seed-borne diseases. The active ingredient triticonazole is a triazole fungicide that provides systemic, broad spectrum protection against seed- and soil-borne diseases.

9. Grazing and Harvest Restrictions: Do not use treated seed for food, feed or oil processing. Do not feed treated seed, or otherwise expose, to wildlife or domestic birds. Do not store treated seed for more than 18 months.

10. Toxicity: Acute oral = >5,000 mg/kg rats, Acute dermal = >2,000 mg/kg rabbits. Tested as mildly irritating to the eye. Tested as slightly irritating to the skin (rabbits). Do not feed treated seed or otherwise expose to wildlife or domestic birds. If treated seed is spilled outdoors or in areas accessible to birds, promptly clean up or bury to prevent ingestion. **Do not** contaminate domestic or irrigation water supplies, lakes, streams, ponds or any other body of water.

11. Precautions, First Aid: Check label for first aid information.

12. Storage: Protect from frost and freezing. Do not store Charter RTU near food, fertilizer, feed or seed.

13. Resistance Management: See page 41 for information on resistance management.

Crown (carbathiin + thiabendazole)

Group 7,1

Manufacturer: Chemtura Co.

1. **Formulations:** 92 g/L carbathiin + 58 g/L thiabendazole (PCP# 23430); 10 L jug.
2. **Registered Mixes:** None.
3. **Crops:** Chickpeas, lentils.
4. **Diseases Controlled:** Chickpeas: Seed-borne Ascochyta (*Ascochyta rabili*). Lentils: Seed-borne Ascochyta (*Ascochyta lentis*), seedling blight, seed rot.
5. **When Used:** Pre-seeding or drill box treatment.
6. **How to Apply:**

With: Protective equipment, using standard dry seed treatment methodology described. Seed-dressing equipment for liquid formulations.

Pre-seeding treatment: Crown can be applied in a continuous treating operation with S-Series Treaters or OFT Treaters, batch treaters or cement mixers.

Rate: Chickpeas: 75 - 150 mL/25 kg. Lentils: 150 mL/25 kg.
7. **Application Tips:** It is important that the seed and chemical are mixed quickly and uniformly. Crown's liquid properties enable this product to act as a sticker for inoculants. The product is SAFE to the nitrogen fixing bacterium found in peat and granular inoculants.
8. **How it Works:** Thiabendazole, a fungicide, controls seed-borne diseases. Carbathiin, a systemic fungicide, penetrates the seed coat to control diseases of the seed and seedling. Controls the diseases listed.
9. **Grazing and Harvest Restrictions:** Do not use treated seed for feed, food or oil processing. Do not leave treated seed exposed to birds or animals.
10. **Toxicity:** Acute oral LD₅₀ (rats) carbathiin = 3,820 mg/kg; thiabendazole = 3,300 mg/kg.
11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** Do not store in or around the home. Do not store Crown at temperatures below 0°C or exceeding 35°C. Label stored, treated seed with: **"Do not use for food, feed or oil-processing. This seed has been treated with carbathiin + thiabendazole. Poisonous to man and animals. Keep out of reach of children."**

DB-Red L (maneb)

Group M

Manufacturer: Loveland Products Inc.



WARNING POISON

1. **Formulations:** 323 g/L ready-to-use liquid (PCP# 27144); 57 L Out-N-Back returnable, 9 L plastic container.
2. **Registered Mixes:** Compatible with most insecticides and fungicides.
3. **Crops:** Barley, oats, rye and wheat.
4. **Diseases Controlled:** Common bunt, covered smut, false loose smut, root rot, seedling blight (including fusarium).
5. **When Used:** Treat seed before sowing at the bin site auger, at the air seeder auger or at the drill fill auger.

DB-Red L (cont'd)

- 6. How to Apply:** DB-Red L is a ready-to-use seed treatment for use with a seed treater suitable for metering and mixing flowable seed treatments. Use the AGSCO liquid seed treater or an equivalent closed treating system to achieve uniform coverage on the seed.

Rate:

Crop	Disease	DB-Red L mL/25 kg seed
Barley	Covered smut, false loose smut, root rot, seedling blight	99
Oats	Covered smut, root rot, seedling blight	138
Rye	Common bunt, root rot, seedling blight	65
Wheat	Common bunt, root rot, seedling blight* (including fusarium)	78

* Treatment with DB-Red L will generally improve emergence of hard red spring wheat where seed has been infected with the head blight fungus (fusarium). Wheat varieties differ in response to this disease.

- 7. Application Tips:** Use only the recommended rate – lower amounts may not give the desired control. Very excessive amounts may delay germination. Seed should be well cured, dry and cleaned before treatment. For maximum benefits, avoid deep seeding and exceptionally early sowing under poor growing conditions.
- 8. How it Works:** AGSCO DB-Red L is a special seed treatment formulation of Maneb, which protects crops against seedborne and soilborne diseases.
- 9. Grazing and Harvest Restrictions:** Do not graze or feed livestock on treated areas. Do not contaminate feed or foodstuffs. Exposed treated seeds may be hazardous to birds and wildlife.
- 10. Toxicity:** Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) maneb = 6,750 mg/kg.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store product in a warm, dry place away from food or feed. Out-N-Back returnable containers must be returned to AGSCO. Credit will be given for unused product returned in Out-N-Back returnable containers. Stored, treated grain should be labelled: **“Do not use for feed or food. This seed has been treated with DB-Red L.”**
- 13. Resistance Management:** See page 41 for information on resistance management.

DCT (*diazinon + captan + thiophanate methyl*)

Fungicide – Insecticide

Group 1B (Insecticide) Group M,1 (Fungicide)

Manufacturer: **Norac Concepts Inc.**

- 1. Formulations:** Wettable powder; 6% diazinon + 18% captan + 14% thiophanate-methyl (PCP# 14986); 10 kg and 400 g.
- 2. Registered Mixes:** None.
- 3. Crops:** Common dry beans, sweet corn.
- 4. Diseases Controlled:** Common dry beans: Seedling blight and root rot, seed-borne Anthracnose. Sweet corn: Seed-borne *Penicillium oxalicum*, *Penicillium* spp.
Insects controlled: Root maggots.
- 5. When Used:** As a seed treatment at planting time.

6. How to Apply:

Common dry beans – slurry machines: Use 520 g seed treatment per litre of water and apply 1 L of slurry per 100 kg of seed. For other rates of slurry application, adjust to maintain 130 g of seed treatment per 5 kg of seed. Hand mixing: For each 25 kg of seed, use 130 g in 350 mL of water. Mix well to keep powder suspended in water. Pour mixture over the seed, and mix with a paddle or shovel until seed is coated evenly. Dry the seed before seeding or bagging.

Sweet corn – as a seed box treatment: Apply 125 g of DCT to 25 kg of seed. When starting with an empty planter, place enough treated seed in the planter box to cover the bottom. Treat this seed in a separate container that can be destroyed later. Add the remaining seed to the planter box, and treat by stirring thoroughly with a paddle or lath so that the seed is coated with the seed treatment.

- 7. Application Tips:** See "How to Apply."
- 8. How it Works:** DCT is a protective seed treatment for the control of seedling diseases and soil insects.
- 9. Grazing and Harvest Restrictions:** Do not use treated seed for food, feed or oil processing.
- 10. Toxicity:** Diazinon may cause cholinesterase inhibition. If poisoning occurs, get prompt medical aid. Atropine is antidotal.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store in cool, dry place away from food or feed. Keep containers closed when not in use. Treated seed should be coloured and labelled: **"Poisonous to humans and animals. This seed has been treated with Diazinon, Captan and thiophanate-methyl for control of insects and seed-borne diseases. Do not use for food or feed purposes."**

Dividend XL RTA

(difenoconazole + metalaxyl-M)

Group 3,4

Manufacturer: Syngenta Crop Protection Canada Inc.



WARNING POISON

- 1. Formulations:** 3.46% FS; 3.37% difenoconazole + 0.27% metalaxyl-M (PCP# 25777); 2 x 10 L jugs, 55 L keg, 115 x 450 returnable totes.
- 2. Registered Mixes:** For the control of true loose smut in barley, mix Dividend XL RTA with either Charter, Baytan 30 or Raxil 250 FL. Refer to each product label for rates.
- 3. Crops:** Barley, durum wheat, corn, oats, rye, spring wheat, triticale and winter wheat.
- 4. Diseases Controlled:** Dwarf bunt, Fusarium and Pythium damping-off, general seed rots (caused by Saprophytic fungi such as *Aspergillus*, *Fusarium*, *Penicillium* and *Pythium*), loose smut, seed- and soil-borne common bunt, seed- and soil-borne Fusarium, seed-borne Septoria, early season control of Septoria leaf blotch.
Fungi suppressed: Common root rot (*Cochliobolus* spp.) and take-all, Fusarium crown and root rot.
- 5. When Used:** Treat seed prior to or at seeding.
- 6. How to Apply:**

With: Dividend XL RTA can be applied on farm or commercially. Dividend XL RTA may be applied to seed with any standard gravity flow or mist-type seed treatment equipment that accurately meters and mixes a flowable seed treatment. Dividend XL RTA may also be used with treat-on-the-go air seeders. The application equipment used must provide uniform coverage of Dividend XL RTA on the seed. Uneven seed coverage may not give the desired level of disease control.

Dividend XL RTA (cont'd)

Rate:

Crop	Disease	mL/100 kg seed
Barley (controlled)	Covered smut, damping-off caused by <i>Fusarium</i> and <i>Pythium</i> , false loose smut, general seed rots caused by <i>Aspergillus</i> , <i>Fusarium</i> , <i>Penicillium</i> and <i>Pythium</i> , seed-borne <i>Septoria</i> , seedling blight caused by seed- and soil-borne <i>Fusarium</i>	325
	Seed-borne <i>Septoria</i>	650
(suppressed)	Common root rot (<i>Cochliobolus</i> spp.), <i>Fusarium</i> crown and foot rot, take-all	325
Durum wheat, spring wheat (controlled)	Common bunt (seed- and soil-borne) damping-off caused by <i>Fusarium</i> and <i>Pythium</i> , general seed rots caused by <i>Aspergillus</i> , <i>Fusarium</i> , <i>Penicillium</i> and <i>Pythium</i> , loose smut, seed-borne <i>Septoria</i> , seedling blight caused by seed- and soil-borne <i>Fusarium</i>	325
	Seed-borne <i>Septoria</i>	650
(suppressed)	Common root rot (<i>Cochliobolus</i> spp.), <i>Fusarium</i> crown and foot rot, take-all	325
Oats (controlled)	Covered smut, damping-off caused by <i>Pythium</i> , general seed rots caused by <i>Aspergillus</i> , <i>Fusarium</i> , <i>Penicillium</i> and <i>Pythium</i> , seedling blight caused by seed- and soil-borne <i>Fusarium</i> , loose smut	325
(suppressed)	Common root rot (<i>Cochliobolus</i> spp.)	325
Rye (controlled)	Common bunt (seed- and soil-borne) damping-off caused by <i>Pythium</i> , general seed rots caused by <i>Aspergillus</i> , <i>Fusarium</i> , <i>Penicillium</i> and <i>Pythium</i> , seed-borne <i>Septoria</i> , seedling blight caused by seed- and soil-borne <i>Fusarium</i>	325
	Note: For control of seed-borne <i>Septoria</i> use the high rate of Dividend XL RTA at 650 mL/100 kg seed.	650
(suppressed)	Common root rot (<i>Cochliobolus</i> spp.), <i>Fusarium</i> crown and foot rot, take-all	325
Triticale (controlled)	Damping-off caused by <i>Pythium</i> , general seed rots caused by <i>Aspergillus</i> , <i>Fusarium</i> , <i>Penicillium</i> and <i>Pythium</i> , loose smut	325
(suppressed)	Common root rot (<i>Cochliobolus</i> spp.), <i>Fusarium</i> crown and foot rot, take-all	325
Winter wheat (controlled)	Common bunt and dwarf bunt (seed- and soil-borne), damping-off caused by <i>Fusarium</i> and <i>Pythium</i> , general seed rots caused by <i>Aspergillus</i> , <i>Fusarium</i> , <i>Penicillium</i> and <i>Pythium</i> , loose smut, seed-borne <i>Septoria</i> and <i>Septoria</i> leaf blotch, seedling blight caused by seed- and soil-borne <i>Fusarium</i>	325
	Note: For control of seed-borne <i>Septoria</i> and leaf blotch use the high rate of Dividend XL RTA at 650 mL/100 kg seed. Dividend XL RTA will control <i>Septoria</i> leaf blotch for the first 4 weeks after planting. For full season control apply a foliar fungicide according to label directions.	650
(suppressed)	Common root rot (<i>Cochliobolus</i> spp.), <i>Fusarium</i> crown and foot rot, take-all	325

Note: One 10 L jug of Dividend XL RTA applied at the 325 mL/100 kg seed rate will treat 112 bushels of wheat, and 140 bushels of barley.

Safety information, see page 25

7. **Application Tips:** Uniform coverage is important to obtain optimum results in the field.
8. **How it Works:** Dividend XL RTA is a systemic seed treatment, which controls or suppresses certain seed- and soil-borne diseases of barley and wheat.
9. **Grazing and Harvest Restrictions:** Do not graze, feed green forage or cut for hay within 35 days of planting. Do not plant any crop other than barley, corn, oats, rye, triticale or wheat within 30 days to fields in which treated seeds were planted.
10. **Toxicity:** Practically non-toxic acute mammalian toxicity. Acute oral LD₅₀ (rats) = 5,050 mg/kg. Toxic to fish and other aquatic invertebrates. Do not apply directly to water or to areas where surface water is present. If treated seed is spilled outdoors or in areas accessible to birds, promptly clean up or bury to prevent ingestion.
11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** Keep product in heated storage prior to use.

Gemini (triticonazole + thiram)

Manufacturer: BASF Canada

Group 3,M



WARNING POISON

1. **Formulations:** 13.75% FS; 1.25% triticonazole + 12.5% thiram (PCP# 27826); 2 x 6 L, 200 L.
2. **Registered Mixes:** None registered.
3. **Crops:** Barley, oats, wheat.
4. **Disease Controlled:**

Wheat: Common bunt, loose smut, *Pythium* damping-off, seed rot caused by *Fusarium* spp., seedling blight caused by seed- and soil-borne *Fusarium* spp.

Barley: Covered smut, false loose smut, *Pythium* damping-off, seed rot caused by *Fusarium* spp., seedling blight caused by seed- and soil-borne *Fusarium* spp., true loose smut.

Oats: Covered smut, loose smut.

Diseases suppressed in wheat and barley: Common root rot caused by *Cochliobolus* sp., fusarium crown and root rot, seedling blight caused by *Cochliobolus* sp.
5. **When Used:** Treat seed prior to or at seeding.
6. **How to Apply:**

With: Gemini can be applied in commercial seed treatment plants and for use in on-farm standard gravity flow or mist type treatment machines. Gemini can also be used in on-the-go air seeder treatment systems. Agitate or shake well prior to usage.

Water volume: Gemini does not require the addition of water for application. When using the Flexi-Coil "On-the-Go" Seed Treatment Unit, please contact BASF AgSolutions at 1-877-371-2273 for Gemini rates used with "On-the-Go" seed treatment units.

Rate:

Crop	Diseases controlled	Diseases suppressed	mL/100 kg of seed
Barley	Covered smut, false loose smut, <i>Pythium</i> damping-off, seed rot and seedling blight caused by seed- and soil-borne <i>Fusarium</i> spp., true loose smut	Common root rot and seedling blight caused by <i>Cochliobolus</i> sp., <i>Fusarium</i> crown and root rot	360
Oats	Covered smut, loose smut.		360

continued

Safety information, see page 25

Gemini (cont'd)

Crop	Diseases controlled	Diseases suppressed	continued
			mL/100 kg of seed
Wheat	Common bunt, loose smut, <i>Pythium</i> damping-off, seed rot and seedling blight caused by seed- and soil-borne <i>Fusarium</i> spp.	Common root rot and seedling blight caused by <i>Cochliobolus</i> sp., <i>Fusarium</i> crown and root rot	360

Bushels Treated

Container size	Barley*	Oats**	Wheat***
6 L jug	76	108	61
200 L drum	2,552	3,602	2,041

* Based on 48lbs/bu

** Based on 34 lbs/bu

*** Based on 60 lbs/bu

7. **Application Tips:** Uniform coverage is important to obtain optimum disease control.
8. **How it Works:** The active ingredients in Gemini are triticonazole and thiram. Triticonazole is a triazole fungicide that provides systemic broad spectrum protection against seed- and soil-borne diseases. Thiram is a dithiocarbamate fungicide with contact activity.
9. **Grazing and Harvest Restrictions:** Treated seed must be labelled "**This seed is treated with Gemini Seed Treatment containing triticonazole and thiram. Do not use for food, feed or oil processing.**" Do not store treated seed for more than 18 months.
10. **Toxicity:** Acute oral >2,000 mg/kg rats, Acute dermal >2,000 mg/kg rats. **Do not** contaminate domestic or irrigation water supplies, lakes, streams, ponds or any other body of water with the chemical, used containers, treated seed or bags that have held treated seed. Do not contaminate water by cleaning equipment or disposal of wastes. Do not store unused or leftover treated seed where there is a chance of it becoming mixed with untreated seed. Do not feed treated seed, or otherwise expose, to wildlife or domestic birds.
11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** Protect from frost or freezing. Do not store Gemini seed treatment near children and animals. Store in an area away from food or feed stuffs.
13. **Resistance Management:** See page 41 for information on resistance management.

Manzate 200/MancoPlus/ Tuberseal/Potato Seed Treatment (mancozeb)

Group M

Manufacturer: Dow AgroSciences Canada/E.I. duPont Canada/Norac Concepts/United Agri Products Canada Inc.

1. **Formulations:** **Manzate 200:** Dispersible granule; 80% (PCP# 10526); 25 kg, 20 kg bags. Dust; **MancoPlus** (PCP# 26157)/**Tuberseal:** 16% (PCP# 17042); 10 kg bags. **Potato Seed Treatment:** 16% mancozeb (PCP# 24734); 20 kg bag.
2. **Registered Mixes:** A dust may be prepared by diluting and thoroughly mixing Manzate 200 with prophylite or other neutral diluent; commonly used insecticides may displace an equivalent amount of diluent. Use dust mixtures as soon as possible after preparation. A spreader-sticker may be added to Manzate 200 in spray preparations.

Safety information, see page 25

Manzate 200/MancoPlus/Tuberseal/Potato Seed Treatment (cont'd)

3. Crops: Alfalfa seed, corn, potatoes.

4. Diseases Controlled: Fusarium decay (potato), root rot (corn).

5. When Used: Potato seed pieces and corn seed: treat before planting.

6. How to Apply:

With: Potato seed duster, protective equipment, using standard seed treatment methodology described.

Rate:

Crop	Disease	Formulation	Quantity
Seed treatments			
Corn seed	Root rot, seedling blight	Manzate 200	0.22 kg/100 kg seed
Potato seed pieces	Fusarium decay	MancoPlus Tuberseal Potato Seed Treatment	0.5 kg/100 kg seed

7. Application Tips:

Corn seed: Apply as dust or slurry. Treated seed should not be stored.

Potato seed pieces: Thoroughly coat the surface of whole or cut potato pieces. If treated whole seed is cut, make a second application. Plant as soon as possible after treating. If planting is delayed beyond 2 days after treating, seed should be air dried before bagging or loose piling.

8. How it Works: A protective seed-treatment fungicide that controls Fusarium decay. A contact fungicide.

9. Grazing and Harvest Restrictions:

10. Toxicity: Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) mancozeb = 11,200 mg/kg. Prolonged exposure may cause eye, nose, throat and skin irritation.

11. Precautions, First Aid: Check label for first aid information.

12. Storage: Store in a cool, dry, ventilated place away from fire and sparks. Do not allow product to become wet or overheated during storage as chemical changes may reduce fungicidal effectiveness and flammable vapours may be generated. Treated seed should be labelled: "**Do not use for food or feed. This seed has been treated with mancozeb. Poisonous to man and animals. Keep out of reach of children.**"

Maxim PSP (fludioxonil)

Group 12

Manufacturer: Syngenta Crop Protection Canada Inc.

1. Formulations: Dust; 0.5% fludioxonil formulated as a dry powder seed piece treatment (PCP# 26647); 10 kg bag.

2. Registered Mixes: None.

3. Crops: Potatoes.

4. Diseases Controlled: Black scurf including stem and stolon canker (*Rhizoctonia solani*), Fusarium dry rot (*Fusarium* spp.) and silver scurf (*Helminthosporium solani*).

5. When Used: Maxim PSP is a preplant seed piece treatment. Cut pieces should be treated immediately after cutting. If treated seed pieces are to be bagged, they should be stored for 2 - 3 days in open crates before bagging. For optimum protection against silver scurf, ensure that seed tubers are completely free of soil. Total skin coverage is essential.

Safety information, see page 25

Maxim PSP (cont'd)**6. How to Apply:**

With: Apply using appropriate seed piece treater designed for treating potatoes.

Rate: 500 g/100 kg seed.

- 7. Application Tips:** For optimum protection against disease, ensure that seed pieces are completely free of soil. Complete coverage of the seed piece with Maxim PSP is essential.
- 8. How it Works:** Fludioxonil is phenylpyrrole chemistry derived and synthesized from exudates of the soil bacterium *Pseudomonas* and possesses contact and local penetrant properties.
- 9. Grazing and Harvest Restrictions:** Do not feed or allow livestock to graze on treated crops.
- 10. Toxicity:** Practically non-toxic, acute toxicity acute oral LD₅₀ (rats) = >5,000 mg/kg. Toxic to aquatic invertebrates and fish. Do not contaminate domestic or irrigation water supplies, lakes, streams and ponds.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store in a dry place.
- 13. Resistance Management:** See page 41 for information on resistance management.

Maxim MZ PSP (fludioxonil + mancozeb)

Group M3, 12

Manufacturer: Syngenta Crop Protection Canada Inc.

- 1. Formulations:** Dry powder; 0.5% fludioxonil + 5.7% mancozeb (PCP# 27965); 10 kg, 20 kg, 22.7 kg bags.
- 2. Registered Mixes:** None.
- 3. Crops:** Potatoes.
- 4. Diseases Controlled:** Black scurf including stem and stolon canker (*Rhizoctonia solani*), Fusarium dry rot (*Fusarium spp.*) and silver scurf (*Helminthosporium solani*).
- 5. When Used:** Maxim MZ PSP is a preplant seed piece treatment. Cut pieces should be treated immediately after cutting. If treated seed pieces need to be stored, ensure there is adequate cool air (15.5 degrees C) movement through the pile of cut potatoes at high relative humidity (85-90%).
- 6. How to Apply:**

With: Apply using appropriate seed piece treater designed for treating potatoes.

Rate: 500 g/100 kg seed.

Apply only in areas with adequate ventilation and/or dust collection and control equipment.
- 7. Application Tips:** Apply using equipment that ensures complete coverage of potato seed pieces.
- 8. How it Works:** Fludioxonil is phenylpyrrole chemistry derived and synthesized from exudates of the soil bacterium *Pseudomonas* and possesses contact and local penetrant properties. Mancozeb is a dithiocarbamate fungicide with contact activity.
- 9. Grazing and Harvest Restrictions:** Do not feed or allow livestock to graze on treated crops.
- 10. Toxicity:** Practically non-toxic, toxicity acute oral LD₅₀ (rats) = >5,000 mg/kg. Toxic to aquatic invertebrates and fish. Do not apply directly to water, or to areas where surface water is present.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store in a dry place.
- 13. Resistance Management:** See page 41 for information on resistance management.

Mertect SC (thiabendazole)

Group 1

Manufacturer: Syngenta Crop Protection Canada Inc.

- Formulations:** Suspension; 500 g/L (PCP# 13975); 4 x 5 L pack.
- Registered Mixes:** Consult with manufacturer before mixing with other chemicals.
- Crops:** Potatoes (tubers).
- Diseases Controlled:** *Fusarium* spp., *Helminthosporium* spp., *Oospora* spp., *Phoma* spp., *Rhizoctonia* spp.
- When Used:** Once per season. **Potatoes:** Post-harvest control of storage rot in whole potatoes.
- How to Apply:**

Water volume: 7.5 L Mertect/170 L of water. 2 L of this suspension treats 1 metric tonne.

Potatoes (storage rot): 7.5 L Mertect/170 L water.

Rate:

Crop	Disease	Quantity
Potatoes	Storage rot	7.5 L of Mertect/170 L of water 2 L of this suspension treats 1,000 kg of potato tubers

- Application Tips:** Do not allow suspension to stand without continuous agitation. Potatoes must rotate along the conveyor line to ensure complete coverage. Prior to treating potatoes destined for export, confirm with the proper authorities that treated potatoes will be allowed entry into the importing country.
- How it Works:** Thiabendazole belongs to the benzimidazole family of fungicides. It has systemic activity.
- Grazing and Harvest Restrictions:** None.
- Toxicity:** Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) thiabendazole = 3,300 mg/kg. May cause skin irritation.
- Precautions, First Aid:** Check label for first aid information.
- Storage:** Minimum storage temperature 0°C.
- Resistance Management:** See page 41 for information on resistance management.

Polyram 16D (metiram)

Group M

Manufacturer: BASF Canada



WARNING CORROSIVE

- Formulations:** Dry flowable; 16% (PCP# 25867); 10 kg box. Polyram 16D is generally used on potato seed treatment.
- Registered Mixes:** None.
- Crops:** Potatoes.
- Diseases Controlled:** *Fusarium* seed piece decay (potatoes), seed-borne common scab (potatoes).
- When Used:** Before seed is cut, warm it to 18°C to 21°C for about 2 weeks in dim light. Cut seed should be planted immediately. If this cannot be done, store cut seed in containers such as crates or burlap bags stacked to allow air movement around each container. Hold at 10°C to 16°C and high relative humidity for 3 or 4 days to allow wound cork to form over cut surfaces.

Safety information, see page 25

Polyram 16D (cont'd)**6. How to Apply:****With:** Potato seed duster.**Rate:**

Crop/disease	Formulation	Quantity/when to use
Potato seed pieces		
Fusarium seed piece decay, seed-borne common scab	Polyram 16D	0.45 - 0.65 kg/100 kg seed. Apply to entire surface of seed pieces after cutting. If not planted immediately, provide sufficient ventilation to allow the cut surfaces to dry. May be applied to uncut seed pieces at the same rate of control of seed-borne common scab. If treated whole seed is cut after treatment, a second application is needed to control Fusarium seed piece decay and black leg.

7. Application Tips:**8. How it Works:** A contact and protectant fungicide.**9. Grazing and Harvest Restrictions:****10. Toxicity:** Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) technical = >5,000 mg/kg.**11. Precautions, First Aid:** Check label for first aid information.**12. Storage:** Store in a cool, dry, ventilated place. Do not allow product to become wet or overheated as this will reduce its effectiveness and may create flammable vapours.**Rancona Apex** (*ipconazole*)**Group 3**

Manufacturer: Chemtura Canada

1. Formulations: Suspension; ipconazole 4.61 g/ (PCP# 29176).**2. Registered Mixes:** None.**3. Crops:** Barley, oats, rye, triticale, wheat.**4. Diseases Controlled:**

Crop	Diseases Controlled	Diseases Suppressed	mL/100 kg seed
Barley, wheat (spring and winter), oats, rye, triticale	General seed rots caused by <i>Penicillium</i> and <i>Aspergillus</i> spp. Seed rot, damping off and seedling blight caused by seed and soil-borne <i>Fusarium</i> spp. Seed rot and seedling blight caused by <i>Cochliobolus sativus</i>	Common root rot caused by <i>Cochliobolus sativus</i> Crown and foot rot caused by <i>Fusarium</i> spp.	325
Barley	True loose smut*, covered smut, false loose smut, leaf stripe.		325-433
Wheat (spring, winter)	Loose smut, common bunt		325
Oats	Loose smut, common bunt		325

* For highly infected seed lots, use a higher rate up to 433 mL/100 kg for true loose smut control.

Safety information, see page 25

5. **When Used:** Rancona fungicide is a ready-to-use formulation designed for commercial or on farm treating with conventional seed treating equipment.
6. **How to Apply:** Utilize on farm or commercial treating equipment (mechanical, slurry, mist-type applicators) which can be calibrated to ensure uniform application of the chemical onto the seed.
7. **Application Tips:** Uniform and accurate application to seed is necessary to ensure optimum performance and best disease control.
8. **How it Works:** Rancona is a broad-spectrum fungicide with systemic properties.
9. **Grazing and Harvesting Restrictions:** Do not graze or feed livestock on treated areas for 30 days after planting. Do not use treated seed for feed, food or oil processing.
10. **Toxicity:** Acute oral LD₅₀ (rats) = >5,000 mg/kg.
11. **Precautions, First Aid:** See label for first aid information.
12. **Storage:** Keep product stored away from food and feed. Store product at temperatures between 0°C and 35°C.
13. **Resistance Management:** See page 41 for information on resistance management.

Raxil MD (tebuconazole + metalaxyl)

Group 3,4

Manufacturer: Bayer CropScience Inc.

1. **Formulations:** Suspension; tebuconazole 5 g/L + metalaxyl 6.6 g/L (PCP# 27692) 2 x 10 L jugs, 200 L.
2. **Registered Mixes:** None.
3. **Crops:** Barley, oats, wheat.
4. **Diseases Controlled:**

Wheat: Loose smut, common bunt or stinking smut, seed rot and pre-emergent damping off caused by seed and soil-borne *Fusarium* spp. Seedling blight caused by seed-borne *Fusarium* spp. Damping off caused by *Pythium* spp. Seed-borne *Septoria nodorum*.

Suppression of root and crown rot caused by seed and soil-borne *Fusarium* spp. Common root rot caused by seed and soil-borne *Cochliobolus sativus*. Seed rot and pre-emergent damping off caused by seed and soil-borne *Cochliobolus sativus*. Seedling blight caused by seed-borne *Cochliobolus sativus*.

Barley: True loose smut, covered smut, false loose smut, seed rot and pre-emergent damping off caused by seed and soil-borne *Fusarium* spp. Seedling blight caused by seed-borne *Fusarium* spp. Damping off caused by *Pythium* spp. Barley leaf stripe.

Suppression of root and crown rot caused by seed and soil-borne *Fusarium* spp. Common root rot caused by seed and soil-borne *Cochliobolus sativus*. Seed rot and pre-emergent damping off caused by seed and soil-borne *Cochliobolus sativus*. Seedling blight caused by seed-borne *Cochliobolus sativus*.

Oats: Covered smut, loose smut, seed rot and pre-emergent damping off caused by seed and soil-borne *Fusarium* spp. Seedling blight caused by seed-borne *Fusarium* spp. Damping off caused by *Pythium* spp.

Suppression of root and crown rot caused by seed and soil-borne *Fusarium* spp. Common root rot caused by seed and soil-borne *Cochliobolus sativus*. Seed rot and pre-emergent damping off caused by seed and soil-borne *Cochliobolus sativus*. Seedling blight caused by seed-borne *Cochliobolus sativus*.

5. **When Used:** Raxil MD fungicide is a ready-to-use formulation designed for commercial or on farm treating with conventional seed treating equipment. which can accurately control application rates and provide good distribution of the chemical onto the seed in the mixing chamber. Uniform application to seed is necessary to

Raxil MD (cont'd)

ensure seed safety and best disease control. Seed is protected by Raxil MD fungicide as soon as it is treated. Seed may be planted immediately.

- 6. How to Apply:** On farm treating with conventional seed treating equipment, which can accurately control application rates and provide good distribution of the chemical onto the seed in the mixing chamber.

Rate: 300 mL of Raxil MD per 100 kg of seed.

Container size	Bushels treated per container		
	Barley*	Oats**	Wheat***
10 L jug	153	216	122
200 L tote	3,055	4,313	2,444

* Based on 48 lbs/bu.

** Based on 34 lbs/bu.

*** Based on 60 lbs/bu.

- 7. Application Tips:** Uniform application to seed is necessary to ensure seed safety and best disease control.
- 8. How it Works:** Raxil MD is a systemic fungicide that is absorbed into the germinating seed and transported through the growing seedling, providing control of seed and seedling diseases.
- 9. Grazing and Harvesting Restrictions:** Do not graze or feed livestock on treated areas for 4 weeks after planting. Do not use treated seed for food, feed or oil processing.
- 10. Toxicity:** Low mammalian toxicity.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store product in original container only, away from other pesticides, fertilizer, food or feed. Store in a cool, dry place and avoid excessive heat. Keep container closed. Do not contaminate water, food or feed by storage, disposal or by cleaning of equipment.

Raxil T (tebuconazole + thiram)

Group 3,M

Manufacturer: Bayer CropScience Inc.

- 1. Formulations:** Flowable; 6.7 g/L tebuconazole + 222 g /L thiram (PCP# 27566); 2 x 10 L jugs.
- 2. Registered Mixes:** None.
- 3. Crops:** Barley, oats, wheat.
- 4. Diseases Controlled:**

Barley: Covered smut, false loose smut, general seed rot (caused by Saprophytic fungi such as *Alternaria*, *Aspergillus* and *Penicillium*), loose smut, *Pythium* seed rot, seed- or soil-borne seed rot and seed-borne seedling blight caused by *Fusarium*, seed rot and seedling blight caused by *Cochliobolus sativus*. Suppression of common root rot caused by *Cochliobolus sativus*. Suppression of *Fusarium* root rot and *Fusarium* crown rot.

Wheat: Common bunt (seed- and soil-borne), general seed rot (caused by Saprophytic fungi such as *Alternaria*, *Aspergillus* and *Penicillium*), loose smut, *Pythium* seed rot, seed borne *Septoria*, seed- or soil-borne seed rot and seed-borne seedling blight caused by *Fusarium*, seed rot and seedling blight caused by *Cochliobolus sativus*. Suppression of common root rot caused by *Cochliobolus sativus*. Suppression of *Fusarium* root rot and *Fusarium* crown rot.

Oats: Loose smut, *Pythium* seed rot, seed- or soil-borne seed rot and seedling blight caused by *Fusarium*, seed rot and seedling blight caused by *Cochliobolus sativus*. Suppression of common root rot caused by *Cochliobolus sativus*.

Safety information, see page 25

5. When Used: A ready-to-apply water based seed treatment formulation for commercial treaters and on farm auger treating. Chemical is added directly to the seed as it enters the mixing chamber or auger. Seed may be planted immediately or can be stored.

6. How to Apply:

With: On farm treatment: through an auger with atomizing equipment or with a pump or drip/gravity device; can also be used with treat-on-the-go air seeders or commercially treated at seed plant.

Water volume: Raxil T is a ready-to-use formulation. When rinsing containers, the water from triple rinsing each container may be added to the seed treatment. If mixing with water, always agitate product before and during use. Increase the undiluted application rate by the % water dilution to compensate for the dilution of the product caused by the addition of the rinsate.

Rate: 225 mL Raxil T per 100 kg of seed for barley, oats or wheat.

Note: Table shows the number of bushels treated per container.

Container size	Barley*	Oats**	Wheat***
10 L jug	204	288	163
200 L tote	4,080	5,750	3,260

* Based on 48 lbs/bu.

** Based on 34 lbs/bu.

*** Based on 60 lbs/bu.

7. Application Tips: Uniform coverage at the correct rate is important for satisfactory results.

8. How it Works: Tebuconazole is a systemic fungicide that is absorbed into the germinating seed and transported through the growing seedling, providing control of seed and seedling diseases. Thiram is a contact fungicide.

9. Grazing and Harvesting Restrictions: Do not graze or feed livestock on crops grown from treated seed for 4 weeks after planting. Do not use treated seed for food, feed or oil processing. Do not feed treated seed, or otherwise expose, to wildlife or domestic birds.

10. Toxicity: Very low mammalian toxicity value. Acute oral LD₅₀ (female rat) = 1,951 mg/kg.
Acute dermal LD₅₀ (rabbit) = >2,020 mg/kg.

11. Precautions, First Aid: Check label for first aid information.

12. Storage: Store product in original container only. Store away from other pesticides, fertilizer, food or feed. Store both product and/or treated seed in a cool, dry place and avoid excessive heat. Stored treated grain should be labeled: "This seed has been treated with Raxil T Flowable Fungicide, which contains the fungicides tebuconazole and thiram."

Senator PSPT (thiophanate methyl)

Group 1

Manufacturer: Engage Agro Corporation

1. Formulations: Dust; 10% (PCP# 26236); 10 kg bag.

2. Registered Mixes: None.

3. Crops: Senator PSPT: Potatoes.

4. Diseases Controlled: Fusarium rot, silver scurf (*Helminthosporium solani*), verticillium wilt. Also aids in control of seed piece decay and blackleg infections.

Senator PSPT (cont'd)

- 5. When Used: Potato seed piece treatment:** Cut pieces should be treated within 6 hours of cutting. If planting is to be delayed more than 1 - 2 days, treated pieces should be stored for 2 - 3 days in open crates before bagging.
- 6. How to Apply:**

With: Senator PSPT: Convenient container or by dust attachment over belt.

Rate: Potatoes: 500 grams per 100 kg of cut seed.

Water volume: Potatoes: Do **not** add water.
- 7. Application Tips:** For optimum control of silver scurf, ensure that seed tubers are completely free of soil. **Total skin coverage of potato is essential.** Reduced control can be expected in fields where volunteers from the previous year's crop act as a source of infection. Consult your provincial specialist for recommendations.
- 8. How it Works:** Senator PSPT is a systemic and is translocated to the early seedling stage of the potato plant. Under cool, wet conditions, Senator PSPT may improve overall emergence due to protecting the tuber and seedling from Fusarium and seed piece decay.
- 9. Grazing and Harvest Restrictions:** Potatoes: None.
- 10. Toxicity:** Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) technical >6,000 mg/kg (practically non-toxic).
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store in a dry place.

Thiram 75WP (*thiram*)**Group M**

Manufacturer: Chemtura Co.



WARNING POISON

- 1. Formulations:** Wettable powder; 75% (PCP# 27556); 5 kg, 25 kg bag.
- 2. Registered Mixes:** None.
- 3. Crops:** Alfalfa, dry beans, grasses, mustard, peas, safflowers, snap beans, soybeans, sugar beets, sweet corn.
- 4. Diseases Controlled:** Damping off; seed decay; seedling blight (corn, beans, grasses, mustard, peas, soybeans, sugar beets); verticillium wilt (alfalfa).
- 5. When Used:** Pre-seeding or drill box treatment: Treat seed before sowing. Seed should be well cured, dry and cleaned before treatment.
- 6. How to Apply:**

Rate:

Crop	Disease	Powder g/25 kg seed
Alfalfa	Verticillium wilt	90
Dry bean, pea, snap bean, soybean	Damping off, seed decay, seedling blight	25 - 35
Field corn	Damping off, seed decay, seedling blight	30
Grasses, mustard, sugar beet	Damping off, seed decay, seedling blight	90
Safflower	Damping off, seed decay, seedling blight	50
Sweet corn	Damping off, seed decay, seedling blight	55

Safety information, see page 25

Water volume for Thiram 75WP:

Slurry treatment on alfalfa and peas: Pre-mix Thiram 75WP in water as indicated below and apply with commercial seed treating equipment.

kg Thiram 75WP	L of water	Alfalfa, kg of seed treated	Peas, kg of seed treated
1.5	5	416	1,070 - 1,498

7. **Application Tips:** Uniform coverage is essential for disease control.
8. **How it Works:** Thiram is a protective fungicide applied as a seed-treatment powder.
9. **Grazing and Harvest Restrictions:** Do not graze treated areas or feed from treated areas to livestock. Do not expose treated seed to birds and other wildlife.
Seed treatment: Do not graze for 4 weeks after planting.
10. **Toxicity:** Low mammalian toxicity. Acute oral LD₅₀ (rats) thiram = 780 - 865 mg/kg, product (800 - 3,100). May irritate eyes, nose, throat or skin. May cause allergenic exzema in sensitive individuals.
11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** Store product and/or treated seed in a cool, dry, ventilated place away from food or feed. Keep away from fire or sparks. Stored treated grain should be labelled: **"Do not use for food or feed. This seed has been treated with Thiram. Poisonous to man and animals. Keep out of reach of children."**

Trilex AL (trifloxystrobin + metalaxyl)

Group 11.4

Manufacturer: Bayer CropScience Inc.

1. **Formulations:** Suspension; trifloxystrobin 13.5 g/L + metalaxyl 10.8 g/L (PCP# 27692) 2 x 10 L jugs, 200 L.
2. **Registered Mixes:** None.
3. **Crops:** Bean (succulent, snap and dry), chickpea, lentil, pea (dry and field), soybean.
4. **Diseases Controlled:**

Bean, chickpea, pea: Seed decay/pre-emergence damping off and post-emergence damping off caused by *Rhizoctonia solani*, *Fusarium* spp. and *Pythium* spp.

Lentil: Seed decay/pre-emergence damping off and post-emergence damping off caused by *Rhizoctonia solani*, *Fusarium* spp. and *Pythium* spp. Seed rot/pre-emergence damping off, post-emergence damping off and seedling blight caused by *Botrytis cinera* (seed-borne).

Soybean: Decay/pre-emergence damping off and post-emergence damping off caused by *Rhizoctonia solani*, *Fusarium* spp., *Pythium* spp. and *Phomopsis longicolla*.

Diseases Suppressed: Suppression of seed-borne *Ascochyta* blight caused by *Ascochyta* spp. in lentil, chickpea and peas (field and dry).
5. **When Used:** Trilex AL seed treatment fungicide is a ready-to-use formulation designed for commercial or on farm treating with conventional seed treating equipment, which can accurately control application rates and provide a good distribution of the chemical onto the seed in the mixing chamber.
6. **How to Apply:** Commercial or on farm treating with conventional seed treating equipment, which can accurately control application rates and provide good distribution of the chemical onto the seed in the mixing chamber.
Rate: 370 mL of Trilex AL per 100 kg of seed.

Safety information, see page 25

Trilex AL (cont'd)

If Trilex AL seed treatment is diluted with water by greater than 10% by volume, ensure agitation of the mixture prior to application to seed.

Seed treatment and inoculants: Trilex AL seed treatment is compatible with Rhizobium-based inoculants. Please check with inoculant manufacturers for further details prior to use.

- 7. Application Tips:** Uniform application to seed is necessary to ensure seed safety and best disease control.
- 8. How it Works:** Trilex AL seed treatment fungicide is a ready-to-use formulation designed for commercial or on farm treating for the control of seed and soil-borne diseases of beans, chickpeas, lentils, peas and soybeans.
- 9. Grazing and Harvesting Restrictions:** Do not graze or feed livestock on treated areas for 4 weeks after planting. Do not use treated seed for food, feed or oil processing.
- Rotational crop restrictions:** Canola, mustard, rapeseed, corn, legumes and cereal grains may be replanted at any time. For all other crops, do not plant back within 30 days of seeding with Jazz-treated seed.
- 10. Toxicity:** Toxic to aquatic organisms. Do not discharge effluent containing this product into sewer systems, lakes, streams, ponds, estuaries, oceans or other waters.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store product in original container only, away from other pesticides, fertilizer, food or feed. Store in a cool, dry place and avoid excessive heat. Keep container closed. Do not contaminate water, food or feed by storage, disposal or by cleaning of equipment.

Vitaflo 280 (carbathiin + thiram)

Group 7, M

Manufacturer: Chemtura Co.



WARNING POISON

- 1. Formulations:** Suspension; (PCP# 22473); 10 L, 200 L.
- 2. Registered Mixes:** None.
- 3. Crops:** Barley, corn, dry beans, flax, lentils, lupins, oats, peas, rye, soybeans, triticale, wheat.
- 4. Diseases Controlled:**

Crop	Diseases Controlled	Diseases Suppressed
Barley	Covered smut, false loose smut, true loose smut, leaf stripe. Seed rot and seedling blight caused by <i>Cochliobolus sativus</i> , <i>Fusarium</i> , <i>Phythium</i> and <i>Penicillium</i> spp. Seed rot caused by <i>Aspergillus</i> and <i>Alternaria</i> .	Net blotch, <i>Fusarium</i> root rot, common root rot (<i>Cochliobolus sativus</i>)
Dry beans, snap beans	Damping off, seed decay.	
Field corn, sweet corn	Damping off, seed decay.	
Flax including Linola	Seed rot, seedling blight.	
Lentils	Seedling blight and seed rot caused by <i>Botrytis</i> , <i>Fusarium</i> , <i>Phythium</i> and <i>Rhizoctonia solani</i> .	
Oats	Covered smut, loose smut, seed rot and seedling blight caused by <i>Cochliobolus sativus</i> , <i>Fusarium</i> , <i>Phythium</i> and <i>Penicillium</i> . Seed rot caused by <i>Aspergillus</i> and <i>Alternaria</i> .	<i>Fusarium</i> root rot, Common root rot (<i>Cochliobolus sativus</i>)
Peas	Seedling blight and seed rot caused by <i>Mycosphaerella</i> (<i>Ascochyta</i>), <i>Fusarium</i> , <i>Phythium</i> and <i>Alternaria</i> .	

continued

Safety information, see page 25

continued

Crop	Diseases Controlled	Diseases Suppressed
Rye	Stem smut, seed rot and seedling blight caused by <i>Fusarium</i> , <i>Pythium</i> and <i>Penicillium</i> . Seed rot caused by <i>Aspergillus</i> and <i>Alternaria</i> .	<i>Fusarium</i> root rot, Common root rot (<i>Cochliobolus sativus</i>)
Soybeans	Seed rot and seedling blight caused by <i>Phomopsis</i> , <i>Rhizoctinia solani</i> and <i>Fusarium</i> .	
Triticale	Damping off, seed decay, seedling blight.	
Wheat	Common bunt, loose smut, seed rot and seedling blight caused by <i>Fusarium</i> , <i>Pythium</i> and <i>Penicillium</i> . Seed rot caused by <i>Aspergillus</i> and <i>Alternaria</i> , seed borne septoria, seed borne dwarf bunt	

5. When Used: Treat seed before sowing. Seed should be well cured, dry and cleaned before treatment.
 VitaFlo 280: Seed should be dry and cleaned before treatment. Seed can be treated prior to seeding.

6. How to Apply:

With: Protective equipment, using standard dry seed treatment methodology described.

VitaFlo 280: On-farm treatment using an auger with a pump, or a drip/gravity device or custom application at seed cleaning plants. This is a water-based formulation.

Note: Table shows the number of bushels treated per container.

Container size	Barley*		Oats**	Lentils/peas***	Wheat***	
	Low rate	High rate	Single rate	Single rate	Low rate	High rate
10 L	202	139	197	111	161	111
200 L	3,985	2,778	3,921	2,222	3,190	2,222

* Based on 48 lbs/bu.

** Based on 34 lbs/bu.

*** Based on 60 lbs/bu.

Rate:

Crop	VitaFlo 280 undiluted (mL/100 kg seed)
Barley	230 - 330*
Dry beans, snap beans	260
Field corn, sweet corn	280
Flax (including Linola)	525
Lentils	330
Oats	330
Peas	260 - 330
Rye	230 - 330*
Soybeans	260
Triticale	200
Wheat	230 - 330

* Use higher rates for true loose smut or stem smut.

7. Application Tips: Treat only clean seed of known quality that is free of debris and dust. Uniform coverage is critical to obtain optimum results; uneven seed coverage may not give the desired level of disease control. Consult manufacturer's label or recommendations with regard to the use of VitaFlo 280 and rhizobia inoculants.

Vitaflo 280 (cont'd)

- 8. How it Works:** Thiram is a fungicide that controls diseases carried on the seed. Carbathiin is a systemic fungicide that penetrates the seed coat to control diseases inside the seed and seedling.
- 9. Grazing and Harvest Restrictions:** Do not use treated seed for feed, food or oil processing. Do not graze or feed livestock on treated areas for 4 weeks after planting.
- 10. Toxicity:** Moderate acute mammalian toxicity. Acute oral LD₅₀ (rats) carbathiin: thiram = 1,600 mg/kg.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Do not store product in or around the home or near food or feed.

Acrobat 50 WP (dimethomorph)

Group 40

Manufacturer: BASF Canada – Distributed through Engage Agro

- 1. Formulations:** Wettable powder; 50% (PCP# 27700); 8 x 1.82 kg.
- 2. Registered Mixes:** Do not apply Acrobat 50 WP fungicide alone. Acrobat 50 WP must be tank mixed with one of the following fungicides: Polyram DF, Dithane DG Rainshield or Bravo 500. Refer to respective tank-mix partner labeling for the product rate, maximum number of applications, application timing and pre-harvest interval.
- 3. Crops:** Potatoes.
- 4. Diseases Controlled:** Late blight, reduces tuber blight caused by *Phytophthora infestans*. Acrobat 50 WP does **not** control early blight disease.
- 5. When Used:** Make the first application when the disease threatens or when the first visible signs of disease occur in the field or nearby. Apply every 5 - 7 days under high disease pressure or every 7 - 10 days under low disease pressure. Under high level of late blight infection, apply after top kill to reduce tuber blight. A minimum interval of 5 days between applications is required.
- 6. How to Apply:**
With: Aircraft or ground equipment. Aerial application in Saskatchewan, Manitoba and Alberta.
Rate: 182 g/ac.
Water volume: Ground: 80 L/ac (18 gallons/ac). Air: minimum 20 L/ac (5 gallons/ac).
- 7. Application Tips:** Good spray coverage is required. It is essential to use Acrobat 50 WP as part of a regularly scheduled preventative fungicide program.
- 8. How it Works:** Acrobat 50 WP has excellent protectant, systemic and anti-sporulant activity. Dimethomorph penetrates the plant and moves upward to protect the leaves and stems.
Effects of rainfall: Do not apply if rain is likely within 2 - 3 hours of spraying. Apply to dry foliage.
- 9. Grazing and Harvest Restrictions:** Do not apply within 4 days of harvest. Do not plant a new crop in the treated area within 120 days of the last application. Use a maximum of 3 applications per season.
- 10. Toxicity:** Acute oral LD₅₀ (male rat) = 2,939 mg/kg. This product is highly toxic to aquatic organisms. Do not apply within 100 m of streams, ponds, rivers and lakes when applying by air and within 50 m when applying by ground. For aerial application, do not apply when wind speed is greater than 16 km/hr.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store under cool, dry conditions in secure, well ventilated buildings away from foodstuffs and animal feed and out of reach of children.
- 13. Resistance Management:** See page 41 for information on resistance management.

Allegro 500F (fluazinam)

Group 29

Manufacturer: Syngenta Crop Protection Canada Inc.

- 1. Formulations:** Fluazinam 40.0% (PCP# 27517); 18.9 L.
- 2. Registered Mixes:** None.
- 3. Crops:** Edible beans, potatoes.

Safety information, see page 25

Allegro 500F (cont'd)

- 4. Diseases Controlled:** Edible beans: White mold; Potatoes: Late Blight
- 5. When Used: Edible beans:** Base application timing on bloom stage of beans. See label for more detail on application timing.
Potatoes: Begin applications when the plants are 15-20 cm tall or when conditions that favour disease development are present.
- 6. How to Apply:**
With: Ground equipment.
Rate: Edible beans: 0.40 L/acre.
Potatoes: 0.16 L/acre.
Water volume: 80-240 L/acre.
- 7. Application Tips:** Optimum disease control is achieved when timing of application is based on environmental factors that favour disease development. Repeat fungicide applications can be made at intervals of 7 to 10 days. For potatoes do not apply more than the seasonal maximum use rate of 1.6 L/acre (10 applications) during each growing season. For edible beans do not apply more than the seasonal maximum use rate of 0.80 L/acre (2 applications) during each growing season.
- 8. How It Works:** Fluazinam is a pyridinamine fungicide with protective (contact) activity.
- 9. Grazing and Harvesting Restrictions:** Preharvest interval: 14 to 30 days. See label for more detailed information.
- 10. Toxicity:** Oral LD₅₀ (rats) >5,000 mg/kg. Toxic to aquatic organisms, non-target terrestrial plants and wild animals. See label for recommended buffer zones.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store in a cool, dry storage area separate from feed, fertilizer or food.
- 13. Resistance Management:** See page 41 for information on resistance management.

Bravo 500 (*chlorothalonil*)**Group M**

Manufacturer: Syngenta Crop Protection Canada Inc.



Caution Poison

- 1. Formulations:** Flowable; 500 g/L (PCP# 15723); 2 x 10 L, 200 L, 450 L.
- 2. Registered Mixes:** Quadris for ascochyta blight on chickpeas.
Mixing instructions: The required amount of Bravo 500 should be added slowly into the spray tank during filling. With concentrate sprays, pre-mix the required amount of Bravo 500 in a clean container and add to the spray tank as it is being filled. Keep agitator running when filling spray tank and during spray operations.
- 3. Crops*:** Chickpeas, field peas, lentil, potato, wheat.
* See label for complete list of registered crops.
- 4. Diseases Controlled:** Anthracnose, Ascochyta (chickpeas, field peas, lentils), Botrytis (potatoes), early and late blight, Septoria glume blotch, Septoria leaf spot, suppression of Fusarium head blight (wheat), tan spot.
- 5. When Used:** Bravo 500 can be used effectively in diluted or concentrated sprays.
- 6. How to Apply:**
With: Ground field sprayers, high clearance sprayers, aircraft.
Water volume: 91 - 650 L/ac for dilute applications; 20 - 40 L/ac for concentrate ground and aerial applications.
Pressure: 345 - 1,380 kPa.
Nozzles: Hollow cone or flat fan. Cone type nozzles are preferred since they will improve coverage.

Safety information, see page 25

Rate:

Crop/disease	Use recommendation
Chickpea	
Ascochyta	Use 1.2 L - 1.6 L/ac in the first application and 0.8 L - 1.2 L/ac in subsequent applications. Make the first application at very early flowering and remaining applications at 10-day intervals. Do not make more than 3 applications per season.
Field peas	
Ascochyta blight <i>Mycosphaerella pinodes</i>	Apply Bravo at a rate of 0.8 L to 1.25 L/ac beginning at early flowering. Make a second application at early pod set (mid-flowering), about 10 days after the first application. If conditions remain favorable for disease, a third application should be made at 10 - 14 days later during pod filling. Always apply the higher rate when conditions are favorable for disease. Do not make more than 3 applications per season.
Lentil	
Anthraxnose, Ascochyta blight	Use recommendations. Use 0.8 - 1.6 L/ac in 91 - 650 L water/ac beginning at pre-flowering prior to row closure, make a second application 10 - 14 days after the first application (during bloom period). Do not make more than two applications per season. Do not apply Bravo in combination with Poast herbicide and Merge surfactant or within 48 hours of the application of Poast and Merge.
Potato	
Early blight or Botrytis vine rot Late blight	Use 0.65 - 1.0 L Use 0.45 - 0.97 L Use sufficient water to obtain adequate spray coverage. Begin applications when plants are 15 - 20 cm high or when disease threatens. Repeat applications at 7 - 10 day intervals or as necessary to maintain disease control. Under severe disease conditions, use the higher rates at 7-day intervals.
Wheat	
Septoria leaf spot, Septoria glume blotch, tan spot	Apply Bravo at 0.6 L to 1.0 L/ac at Zadoks growth stage 37 (flag leaf emergence), and repeat 10 - 14 days later at Zadok's growth stage 51 - 55 (head visible). A third application at Zadok's 59 - 69 (head fully visible) may be necessary if conditions favor disease spread.
Wheat	
Suppression of Fusarium head blight (scab)	Apply Bravo at 0.8 L to 1.0 L/ac at Zadoks growth stage 61 - 65 (early flowering) to suppress Fusarium head blight. For best results, this application must be made prior to conditions favoring infection, before flowering has started in the majority of tillers. Do not make more than 3 applications per season.

7. Application Tips: Thorough, uniform coverage is essential for disease control. Bravo is rainfast once the spray solution has dried on the plant surface.

8. How it Works: A contact and protectant fungicide.

9. Grazing and Harvest Restrictions: Do not feed or allow grazing of treated material to livestock.

Crop	Days to harvest	Crop	Days to harvest
Chickpea, lentil	48	Potato	1
Field peas	32	Wheat	30

10. Toxicity: Low acute mammalian toxicity. Acute oral LD₅₀ (rats) = 4,200 mg/kg.

11. Precautions, First Aid: Check label for first aid information.

12. Storage: Do not store near food or feed. Protect from excessive heat.

Copper Spray/Copper 53W

(copper)

Group M

Manufacturer: United Agri Products Canada Inc.



Warning Poison

1. **Formulations: Copper 53W:** (copper from tri-basic copper sulphate 53%) (PCP# 9934); 10 kg.
Copper Spray: (copper from copper oxychloride 50%) (PCP# 19146); 25 kg, 2 kg.
2. **Registered Mixes:** None.
3. **Crops:** Potatoes.
4. **Diseases Controlled:** Early and late blight.
5. **When Used:** Start applications when plants are 10 - 20 cm high and repeat at 7 - 10 day intervals.
6. **How to Apply:** Apply with ground equipment. Apply in enough water to ensure thorough coverage.
Rate: Copper 53W - 5.5 kg/ha. Copper spray - 4kg/ha.
7. **Application Tips:** Continuous agitation required.
8. **How it Works:** Contact fungicide.
9. **Grazing and Harvest Restrictions:** May be used up to 1 day before harvest.
10. **Toxicity:** Low mammalian toxicity.
11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** Store in a cool, dry, well ventilated area out of reach of children and animals.

Curzate 60 DF

(cymoxanil)

Group U

Manufacturer: E.I. duPont Canada Co.

1. **Formulations:** Dry flowable; 60% (PCP# 26284); 1.8 kg.
2. **Registered Mixes:** Manzate 200 DF
Mixing instructions: Ensure the spraying equipment is clean.
 1. Fill spray tank 1/4 - 1/3 full with clean water and engage agitation. Prepare mixture volume to apply a minimum of 200 litres spray volume per hectare.
 2. With the agitator running, add the required amount of Curzate 60 DF slowly to the spray tank. Then add the required amount of Manzate 200 DF to the spray tank while maintaining the spray solution agitation.
 3. Continue to agitate until Curzate 60 DF and Manzate 200 DF are completely dispersed.
 4. Completely fill the remainder of the spray tank with water.
 5. On repeat tank loads, draw down the tank contents to less than 10% of the original volume, and repeat from step 1. If more than 10% of the spray volume remains, pre-slurry the Curzate 60 DF and Manzate 200 DF in a bucket of water before adding to the spray tank.

Note: Continuous agitation is required to keep Curzate 60 DF and Manzate 200 DF in suspension in the spray tank for a uniform application.

Use spray preparation of Curzate 60 DF and Manzate 200 DF within 48 hours, or product degradation may occur. If spray preparation is left standing without agitation, thoroughly agitate before spraying.
3. **Crops:** Potatoes.

Safety information, see page 25

4. Diseases Controlled: Late blight (*Phytophthora infestans*).

5. When Used: Use Curzate 60 DF only in a tank mix with Manzate 200 DF.

Initial application should start when local conditions indicate that late blight is imminent; make additional applications at 5 - 7 day intervals.

6. How to Apply:

With: Ground equipment only. Do not apply by air.

Rate: Apply Curzate 60 DF at 0.091 kg/ac plus Manzate 200 DF at 0.65 kg/ac.

Water volume: 20 - 100 L/ac.

Pressure: 210 - 275 kPa.

Nozzles: Hollow cones or flat fan. Do not use flood jet nozzles. Use 50 mesh screens or larger.

Sprayer cleanup: Immediately after application, thoroughly remove all traces of Curzate 60 DF and Manzate 200 DF from mixing and spray equipment. Follow these instructions:

1. Completely drain tank, then flush tank, boom and hoses with clean water for a minimum of 10 minutes. Visually inspect tank to assure removal of all visible residues of Curzate 60 DF and Manzate 200 DF. If necessary, repeat step 1.
2. Do not clean sprayer near well or water source or near desirable vegetation.
3. Remove the nozzles and screens, and clean separately in a bucket containing cleaning agent and water.
4. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing water through the hoses and boom.

7. Application Tips: Do not apply to a potato crop that is suffering from stress as a result of drought, water saturation, low temperatures, insect infestations, nutrient deficiency or any other factors contributing to a reduction in crop growth.

Do not apply product during periods of intense rainfall, or to soils saturated with water. Do not apply directly to standing or running water. Do not apply in areas where surface water from treatment site can runoff to adjacent cropland, either planted or to be planted, or into streams, irrigation waters or wells. Do not contaminate any body of water, including irrigation water.

Care must be taken to avoid spray drift outside the target area or onto ponds, waterways or ditches.

8. How it Works: The active ingredient cymoxanil in Curzate 60 DF is a highly active, locally systemic fungicide recommended for the control of late blight on potatoes. It works at several levels of preventative, curative and inhibitive (against sporulation).

Curzate offers a unique feature for late blight management called "kick-back" activity. It controls infections that have already attacked the crop but are not yet visible. This unique activity is especially important in preventing late blight flare-ups after an infection period has already occurred or in areas more prone to disease because of microclimates. Kick-back is also important for protecting new foliage that developed after the last fungicide treatment. The active ingredient mancozeb in Manzate 200 DF is a dithiocarbamate fungicide with contact activity.

Effects of rainfall: Curzate is rainfast within 2 hours after application.

9. **Grazing and Harvest Restrictions:** Do not harvest within 8 days of treatment. Do not re-enter treated area within 24 hours. A buffer zone of 50 metres is required between the downwind edge of the boom and sensitive aquatic habitats such as ponds, lakes, rivers, streams and wetlands. Do not contaminate these habitats when cleaning and rinsing equipment or containers. Do not mix, load or apply within 15 metres of all wells. Do not use on hydroponically grown crops or on any container-grown crops or ornamentals.
10. **Toxicity:** High acute mammalian toxicity. Acute oral LD₅₀ (rats) = >433 mg/kg. May irritate eyes, nose, throat and skin. May be harmful if inhaled or swallowed.
11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** Store product in original container in a secure, dry area away from food or feed. Protect against humid air and water. Not for use or storage in or around the home. Keep container tightly closed.
13. **Resistance Management:** See page 41 for information on resistance management.

Safety information, see page 25

Dithane DG 75/ Manzate 200, 75DF, Pro-stick/ Penncozeb 75DF, 80WP

(mancozeb)

Group M

Manufacturer: Dow AgroSciences/E.I. duPont/United Phosphorus/United Agri Products (distributor)

1. **Formulations:** Dispersible granule; **Dithane DG 75:** 75% (PCP# 20553); 20 kg bag.
Manzate 200: 80% (PCP# 10526); 2.5 kg, 20 kg bags. **Manzate 75DF:** 75% (PCP# 21057); 20 kg bags.
Manzate Pro-stick: 75% (PCP# 28217); 20 kg bags. **Penncozeb 75DF:** (PCP# 25397); 20 kg bags.
Penncozeb 80WP: 80% (PCP# 25396); 20 kg bags.
2. **Registered Mixes:** A dust may be prepared by diluting and thoroughly mixing Manzate 200 with prophylite or other neutral diluent; commonly used insecticides may displace an equivalent amount of diluent. Use dust mixtures as soon as possible after preparation. A spreader-sticker may be added to Manzate 200 in spray preparations.
3. **Crops:** Alfalfa for seed, lentils, potatoes, sugar beets, wheat (all varieties, including durum).
4. **Diseases Controlled:**

Anthrachnose (lentils)	leaf rust (wheat)	Septoria (wheat)
Ascochyta blight (lentils)	leaf spot (alfalfa)	stem spot (alfalfa)
Cercospora leaf spot (sugar beet)	root rot (corn)	tan spot (wheat)
early and late blights (potato)	seedling blight (corn)	
5. **When Used: Foliar sprays:**

Lentils: Apply the first application before flower when bud formation is evident. A second application should be applied 10 - 12 days after the initial application, but before rows close in to form a dense canopy. If conditions for disease persists, a third application may be applied 10 - 14 days later.

Early and late blights in potatoes: Apply when plants are 10 - 15 cm tall; repeat at 7 - 10 day intervals.

Cercospora leaf spot in sugar beets: Apply when disease first threatens and repeat at 7 - 10 day intervals.

Foliar spray on wheat: An early application can be made at Feeks 1 - 3 growth stage or when crop is in the 3 leaf to tillering stage and/or a late application can be made at Feeks 10.5 when the head is fully emerged but prior to flowering.
6. **How to Apply:**

With: Aircraft, ground equipment.

Water volume: Aircraft: 18 L/ac (4 gallons/ac); Ground: 45 - 80 L/ac (10 - 18 gallons/ac);
Sugar beets: 324 L/ac.

Pressure: 345 kPa.

Nozzles: Hollow cones or flat fan recommended.

Rate: Potatoes: start with low rate and increase to maximum rate as foliage develops.

Dithane DG 75/Manzate 200, 75DF, Pro-stick/Penncozeb 75DF, 80WP (cont'd)

Crop	Disease	Formulation	Quantity
Foliar sprays			
Alfalfa	Leaf stem blight, root rot, seedling blight	Dithane DG 75, Manzate 200/75DF/Pro-stick	0.59 kg/ac
Lentils	Anthrachnose, Ascochyta blight	Dithane DG 75, Manzate 200/75DF/Pro-stick	0.9 kg/ac
Potatoes	Early and late blight	Dithane DG 75, Manzate 200/75DF/Pro-stick, Penncozeb 75DF/80WP	0.44 - 0.90 kg/ac
Sugar beets	Cercospora leaf spot	Dithane DG 75, Manzate 200	0.91 kg/ac
Wheat	Leaf rust, Septoria, tan spot	Dithane DG 75, Penncozeb 75DF/80WP	Early spray: 0.45 kg/ac Late spray: 0.9 kg/ac

7. Application Tips: Sprays: Continuous agitation required.

8. How it Works: A contact fungicide.

9. Grazing and Harvest Restrictions:

Application restrictions: Do not make more than 2 applications of Dithane DG 75 in wheat during the season. Do not make more than 3 applications of Dithane DG 75 in lentils during the season.

Grazing restrictions: Do not graze treated crops or cut for hay; there is insufficient data to support such use.

Pre-harvest interval (days): Lentils (35), potatoes (1), sugarbeets (21), wheat (40).

10. Toxicity: Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) mancozeb = 11,200 mg/kg. Prolonged exposure may cause eye, nose, throat and skin irritation.

11. Precautions, First Aid: Check label for first aid information.

12. Storage: Store in a cool, dry, ventilated place away from fire and sparks. Do not allow product to become wet or overheated during storage as chemical changes may reduce fungicidal effectiveness and flammable vapours may be generated. Treated seed should be labelled: **"Do not use for food or feed. This seed has been treated with mancozeb. Poisonous to man and animals. Keep out of reach of children."**

Folicur 432 F (tebuconazole)

Group 3

Manufacturer: Bayer CropScience Inc.

1. Formulations: Flowable; 432 g/L tebuconazole (PCP# 25940); 9.46 L or 4.73 L jug.

2. Registered Mixes: Buctril M, Buctril M + Puma¹²⁰ Super, Refine Extra + Puma¹²⁰ Super.

Note: Insecticides – Folicur 432 F can be tank-mixed with Lorsban 4E insecticide for control of orange wheat blossom midge (*Sitodiplosis mosellana*) in wheat. See Lorsban label for more details on its use.

3. Crops: Wheat (spring, durum, winter).

4. Diseases Controlled: Suppression of *Fusarium* head blight (scab). Control of leaf, stem and stripe rusts, *Septoria* leaf blotch, *Septoria* glume blotch, tan spot and powdery mildew.

Safety information, see page 25

Folicur 432 F (cont'd)**5. When Used:**

Leaf diseases: Apply Folicur 432 F to leaf foliage at the first sign or very early stage of disease, especially if weather conditions are conducive to disease development, up to the end of flowering stage.

Fusarium head blight: Head blight is extremely difficult to control. For that reason, only suppression of Fusarium head blight (scab) is claimed. **Timing of application is critical:** for optimum suppression of Fusarium head blight, apply Folicur 432 F within the time period from when at least 75% of the wheat heads on the main stem are fully emerged to when 50% of the heads on the main stem are in flower. Fusarium head blight (scab) outbreaks occur when the weather is warm and wet at the flowering to soft dough stages.

Tank mix application: With Buctril M: 4 leaf to early flag. With Buctril M + Puma¹²⁰ Super or Refine Extra + Puma¹²⁰ Super: 4 leaf up to the third tiller. Do not apply Folicur 432 F mixed with Puma¹²⁰ Super 2 - 3 days prior to or following cold temperatures (3°C or lower) as crop injury may occur.

6. How to Apply:

With: Aircraft or ground equipment.

Rate:

Crop	Disease	mL/ac
Wheat	Suppression of <i>Fusarium</i> head blight, control of <i>Septoria</i> glume blotch	118
Wheat	Rusts (leaf, stem, and stripe), <i>Septoria</i> (leaf blotch), tan spot	89* - 118
Wheat	Powdery mildew	118

* Herbicide tank mixes with Folicur are registered only at 89 mL/ac for the control of early season leaf diseases and weeds on the respective labels.

Water volume:

Ground: minimum of 40 L/ac.

Aircraft: minimum of 19 L/ac.

7. Application Tips: Folicur 432 F is recommended for use with Agral 90 or AgSurf at 0.125% v/v.

Spray coverage is essential: ensure thorough coverage of all wheat heads for optimal suppression of Fusarium head blight.

8. How it Works: Folicur 432 F is a broad spectrum fungicide for disease control in cereals with preventative, curative and eradicated properties.

9. Grazing and Harvest Restrictions: Maximum of one application per crop season.

Preharvest intervals (days): Grazing (6), grain, hay or straw (36).

10. Toxicity: Oral LD₅₀ (female rat) 3,710 mg/kg.

11. Precautions, First Aid: Check label for first aid information.

12. Storage: Store container in a cool, dry place and in such a manner as to prevent cross contamination with other pesticides, fertilizers, food and feed. Store in original container and out of the reach of children, preferably in a locked storage area. Do not contaminate water, food or feed by storage or disposal.

13. Resistance Management: See page 41 for information on resistance management.

Gavel 75 DF (mancozeb + zoxamide)

Group M,22

Manufacturer: Gowan Company

1. Formulations: Dry flowable; 66.7% mancozeb and 8.3% zoxamide (PCP# 26842); 20 kg bag.

Safety information, see page 25

2. **Registered Mixes:** None.
3. **Crops:** Potatoes.
4. **Diseases Controlled:** Early and late blight.
5. **When Used:** Begin applications at the first sign of disease or when blight is reported in the area. Apply every 7 days under high disease pressure when either disease is present and environmental conditions favour continued disease development. Maximum of 6 applications per season with a 3 day pre-harvest interval (PHI).
6. **How to Apply:**

With: Ground equipment or aircraft.

Rate: 0.69 to 0.90 kg/ac.

Water volume: Ground equipment: 90 L/ac. Aircraft: 18 to 36 L/ac.

Nozzles: Ground equipment: Generally hollow cone, disc – D5 to D7.
7. **Application Tips:** Optimum disease control is achieved when the fungicide is applied in a regularly scheduled preventative spray program. Begin applications at the first sign of disease or when blight is reported in the area. Apply Gavel at 0.90 kg/ac every 7 days under high disease pressure when either disease is present and environmental conditions favour continued disease development. Gavel can be applied at 0.68 kg/ac every 7 days under low disease pressure and environmental conditions unfavourable for disease development. Thorough, uniform coverage is essential for good disease control. Under high disease pressure, use higher water volume (36 L/ac) to provide better crop coverage. For best results, use hollow cone brass nozzles with a D-series orifice discs and cores (whirlplate). Nozzles should point straight down or slightly backward.
8. **How it Works:** The active ingredient zoxamide is a benzimidazole type fungicide with contact activity. The mancozeb component is a dithiocarbamate fungicide with contact activity.
9. **Grazing and Harvest Restrictions:** **Preharvest interval:** 3 days. **Recropping:** A 30 day plant back interval (PBI) is required for leafy vegetables and root and tuber vegetables. For all other crops not included on the label, the PBI should be 140 days. **Applications:** Maximum of 6 applications per season.
10. **Toxicity:** Practically non-toxic, oral LD₅₀ (rats) >5,000 mg/kg. Toxic to fish. Drift and runoff from treated areas may be hazardous to aquatic organisms. Do not apply directly to water or to areas where surface water is present.
11. **Precautions, First Aid:** Check label for first-aid information.
12. **Storage:** Do not allow product to freeze. Keep away from fire and sparks. Store in a cool, dry, well ventilated place away from feed or food.
13. **Resistance Management:** See page 41 for information on resistance management.

Headline Duo (boscalid + pyraclostrobin)

Group 7,11

Manufacturer: BASF Canada

1. **Formulations:** Water dispersible granule (WDG); **Headline Duo One:** 25.2% boscalid and 12.8% pyraclostrobin (PCP# 28862). **Headline Duo Two:** 70% boscalid (PCP# 28863); 2 x (Headline Duo One 6.4 kg + Headline Duo Two 1.16 kg). Jugs are split internally and contain both Headline Duo One and Headline Duo Two. Each split jug treats 20 ac.
2. **Registered Mixes:** None.

Safety information, see page 25

Headline Duo (cont'd)

3. Crops: Chickpeas.

4. Diseases Controlled: *Ascochyta* blight (*Ascochyta rabiei*).

5. When Used: Apply Headline Duo One at 0.320 kg/acre and Headline Duo Two at 0.058 kg/ac at the beginning of flowering **or** at the onset of symptoms. *Ascochyta* blight can develop quickly once established, so early detection is essential.

Do not apply sequential applications of this tank mixture combination; alternate to a fungicide with a mode of action other than Group 7 or 11 for at least one application.

6. How to Apply:

With: Ground and aerial application.

Rate: Headline Duo One must be tank mixed at a rate of 0.320 kg/ac with Headline Duo Two at 0.058 kg/ac Lance WDG.

Water volume: Ground application: Minimum water volume of 40 L/ac. Aerial application: Minimum water volume of 20 L/ac.

Pressure: Consult nozzle manufacturer's recommendation for spray pressures for specific nozzles.

7. Application Tips: Clean the spray tank following sprayer cleanup recommendations on the label of the product applied previously. Fill the spray tank 1/2 full with clean water and begin agitation. Add the specified amount of Headline Duo fungicide to the tank. Continue agitation while filling the tank to the desired volume to obtain the required spray concentration. Maintain agitation throughout the spraying operation. If the spray solution sits in the tank for more than one hour without being sprayed out, make sure it is in solution prior to subsequent application. Good coverage is essential for effective disease control. Any reduction in water volume can reduce disease control.

As with all fungicides, coverage is very important, and higher water volumes tend to increase performance with dense canopies.

As with all fungicides, Headline Duo works best if it is applied in a preventative manner and performs best if applied in a regularly scheduled protective spray program. Do not apply more than 2 applications of this tank mixture combination per year.

Do not apply during periods of dead calm or when wind velocity and direction pose a risk to spray drift.

Note: Do not apply in greenhouses.

8. How it Works: The active ingredient pyraclostrobin is a member of the strobilurin class of chemistry, and boscalid belongs to the anilid class of chemistry. Headline Duo inhibits spore germination, mycelial growth and sporulation of the fungus on the leaf surface.

Effects of rainfall: Do not apply if rain is likely to occur within 1 hour of spraying.

9. Grazing and Harvest Restrictions: All crops can be grazed and fed to livestock.

Pre-harvest interval: 30 days. Do not enter treated area until 48 hours after application.

Crop rotation restriction: A plant-back restriction of 14 days is required for all crops not on the label.

10. Toxicity: Acute oral LD₅₀ (male rat): >500 mg/kg. Acute dermal LD₅₀ (rat): >4,000 mg/kg. Treat symptomatically.

11. Precautions, First Aid: Check label for first aid information.

12. Storage: Store in a cool, dry, locked, well ventilated area without floor drain.

13. Resistance Management: See page 41 for information on resistance management.

Headline EC (pyraclostrobin)

Group 11

Manufacturer: BASF Canada

1. **Formulations:** Liquid; emulsifiable concentrate; 250g/L (PCP# 27322); 2 x 6.5 L jug or 104 L tote.
2. **Registered Mixes: Potatoes:** Headline EC (0.18 - 0.27 L/ac) can be tank mixed with Bravo 500 or Polyram DF for control of late blight on a 7 - 10 day spray interval. **Chickpeas:** Headline EC must be tank mixed (0.16 - 0.24 L/ac) with Lance (146 - 170 g/ac) for Ascochyta blight control.
3. **Crops:** Barley, chickpea, corn, dry and succulent bean, dry and succulent field peas, fababean, flax, grasses grown for seed (bluegrass, fescue, ryegrass), lentil, lupins, oats, potatoes, rye, seed alfalfa, soybean, sugarbeets, wheat.
4. **Diseases Controlled:** See table in "How to Apply" section for diseases controlled.
5. **When Used:** Maximum of two applications per season unless otherwise specified.

Alfalfa (seed production only): Apply at the beginning of flowering (10 - 30% bloom) or at the onset of disease. Do not make more than 1 application per season. Do not apply by air.

Barley, oats, rye, wheat: To maximize yield in cereals, it is important to protect the flag leaf from disease. The optimum time for application is immediately after flag leaf emergence.

Chickpea: Apply Headline EC at 0.16 - 0.24 L/ac tank mixed with Lance at 146 - 170 g/ac at the beginning of flowering **or** at the onset of disease symptoms for Ascochyta blight control in chickpeas. Ascochyta blight in chickpeas can develop quickly once established so early detection is essential for the success of any fungicide program. Do not apply sequential applications of this tank mixture combination. Alternate to a fungicide with a mode of action other than Group 7 or Group 11 for at least one application.

Corn (field, pop, seed, and sweet types): For optimum disease control, begin all applications prior to disease development and continue on a 7 - 14 day interval if conditions are conducive to disease development. Use a higher rate and shorter interval if disease pressure is high.

Dry field bean, dry field pea, fababean, lentil: Apply at the beginning of flowering or at the onset of symptoms for the more aggressive diseases (Anthracnose in lentils); apply a second application 10 - 14 days later if disease persists or if weather conditions are favourable for disease development. Early applications are key to optimizing disease control. Anthracnose in lentils and Asian rust in soybeans develop quickly once established, so early detection is essential to the success of any fungicide program.

Flax (including low linolenic acid varieties): Apply at mid-flower (7 - 10 days after the initiation of flowering). Apply a second time 10 - 14 days later if disease persists or weather conditions are favourable for disease development. Use the high rate and shorter spray interval where conditions conducive to severe disease are expected. Do not make more than two applications of Headline EC fungicide or other strobilurin fungicides per season.

Grasses grown for seed: Apply prior to disease development; apply a second application 14 - 21 days later if disease conditions persist.

Potatoes: Applications should begin prior to row closure or before symptoms appear; use higher rates of Headline EC alone or in tank mix with either Bravo 500 or Polyram DF under heavy disease pressure; refer to the respective tank mix partner for rates, additional recommendations, restrictions and precautions; do not make more than 6 applications of Headline EC per season.

Soybeans, edible-podded legumes and succulent beans and peas: Applications should be made at the beginning of flowering or at the onset of symptoms for the more aggressive diseases (e.g. ascochyta blight). Apply a second time 10 - 14 days later if disease persists or if weather conditions are favourable for disease development. Use a higher rate to obtain extended protection.

Sugarbeets: Apply at the onset of cercospora leaf spot and powdery mildew; do not make more than 4 applications per season. Do not make more than 2 applications before alternating to a fungicide with a different mode of action.

Safety information, see page 25

Headline EC (cont'd)

6. How to Apply:

With:

Aerial and ground equipment: Cereals (including corn and oats), flax, grasses grown for seed, seed alfalfa, potatoes, pulses (including edible-podded legumes, succulent beans and peas, fababeans) and soybeans.

Ground equipment: Sugarbeets.

Rate:

Alfalfa grown for seed (ground and aerial application)

Crop	Disease controlled	Rate (L/ac)
Alfalfa (seed production only)	Common leaf spot (<i>Pseudopeziza medicaginis</i>)	0.16

Cereals (ground and aerial application)

Crop	Disease controlled	Rate (L/ac)
Barley	Net blotch (<i>Pyrenophora teres</i>)	0.12 - 0.24
	Scald (<i>Rhynchosporium secalis</i>), spot blotch (<i>Cochliobolus sativus</i>), stripe rust (<i>Puccinia striiformis</i>)	0.16 - 0.24
Corn	Common rust (<i>Puccinia sorghi</i>), gray leaf spot (<i>Cercospora zeae-maydis</i>)	0.16 - 0.24
Oats	Crown rust (<i>Puccinia coronata</i>)	0.12 - 0.16
Rye	Leaf rust (<i>Puccinia recondita</i>)	0.12 - 0.24
	Powdery mildew (<i>Erysiphe graminis</i>)	0.16 - 0.24
Wheat	Leaf rust (<i>Puccinia recondita</i>), Septoria leaf spot (<i>Septoria tritici</i> or <i>Leptosphaeria nodorum</i>), tan spot (<i>Pyrenophora tritici-repentis</i>)	0.12 - 0.24
	Powdery mildew (<i>Erysiphe graminis</i> f. sp. <i>tritici</i>), spot blotch (<i>Cochliobolus sativus</i>), stripe rust (<i>Puccinia striiformis</i>)	0.16 - 0.24

Grasses grown for seed (ground and aerial application)

Crop	Disease controlled	Rate (L/ac)
Bluegrasses, fescues, ryegrasses	Leaf and stem rust (<i>Puccinia recondita</i> ; <i>P. graminis</i>), powdery mildew (<i>Erysiphe graminis</i>)**	0.16 - 0.27

** Suppression.

Pulses (ground and aerial application)

Crop	Disease controlled	Rate (L/ac)
Chickpeas*	Ascochyta blight (<i>Ascochyta</i> spp.)	0.16 - 0.24
Dry beans (<i>Phaseolus</i> , <i>Vigna</i> and <i>Lupinus</i> spp.)	Anthrachnose (<i>Colletotrichum</i> spp.),	0.16
	Mycosphaerella blight (<i>Mycosphaerella</i> spp.),	
	powdery mildew (<i>Erysiphe</i> spp.), rust (<i>Uromyces</i> spp.)	
Dry field peas	Asian soybean rust (<i>Phakopsora pachyrhizi</i>)	0.16 - 0.24
	Mycosphaerella blight (<i>Mycosphaerella</i> spp.), powdery mildew (<i>Erysiphe</i> spp.)	0.16
	Asian soybean rust (<i>Phakopsora pachyrhizi</i>)	0.16 - 0.24
Fababean	Mycosphaerella blight (<i>Mycosphaerella</i> spp.), powdery mildew (<i>Erysiphe</i> spp.)	0.16
	Asian soybean rust (<i>Phakopsora pachyrhizi</i>)	0.16 - 0.24
Lentil	Anthrachnose (<i>Colletotrichum truncatum</i>), Ascochyta blight (<i>Ascochyta</i> spp.)	0.16

Safety information, see page 25

Succulent beans and peas (<i>Phaseolus</i> , <i>Vigna</i> and <i>Pisum</i> spp.)	Ascochyta blight (<i>Ascochyta</i> spp.), Mycosphaerella blight (<i>Mycosphaerella</i> spp.), rust (<i>Uromyces</i> spp.)	0.16 - 0.24
	Asian soybean rust (<i>Phakopsora pachyrhizi</i>)	0.16 - 0.24
Edible-podded legumes	Angular leaf spot (<i>Phaeoisariopsis griseola</i>)	0.16

* Headline EC must be tank-mixed with 0.14-0.17 kg/acre of LANCE fungicide for the control of Ascochyta blight.

Potato (ground and aerial application)

Crop	Disease controlled	Spray interval	Rate (L/ac)
Potatoes	Early blight (<i>Alternaria solani</i>)	7 to 14 days	0.18 - 0.27
	Late blight (<i>Phytophthora infestans</i>)	5 to 7 days	0.18 - 0.27
	Tank mix Headline EC with Bravo 500 or Polyram DF	7 to 10 days	0.18 - 0.27

Flax, soybeans and sugar beets

Crop	Disease controlled	Rate (L/ac)
Flax	Pasmo (<i>Septoria linicola</i>)	0.12 - 0.16
Soybeans	Asian soybean rust (<i>Phakopsora pachyrhizi</i>), frog eye leaf spot (<i>Cercospora sojae</i>)	0.16 - 0.24
Sugarbeets*	Cercospora leaf spot (<i>Cercospora beticola</i>), powdery mildew (<i>Erysiphe betae</i>)	0.27 - 0.36

* Ground application only.

Water volume:

Aerial application: Minimum of 20 L/ac (4.5 gal/ac).

Ground application: Minimum of 40 L/ac (9 gal/ac). Minimum of 80 L/ac (18 gal/ac) for potatoes and sugarbeets.

As with all fungicides, coverage is very important and higher water volumes tend to increase performance with dense canopies.

Pressure: Consult nozzle manufacturers' recommendation for spray pressures for specific nozzles.

- Application Tips:** Clean the spray tank following sprayer cleanup recommendations on the label of the product applied previously. Fill the spray tank 1/2 full with clean water and begin agitation. Add the specified amount of Headline fungicide to the tank. Continue agitation while filling the tank to the desired volume to obtain the required spray concentration. Maintain agitation throughout the spraying operation. Good coverage is essential for effective disease control. Any reduction in water volume can reduce disease control.

As with all fungicides, Headline works better if it is applied in a preventative manner and performs best if applied in a regularly scheduled protective spray program.

- How it Works:** Headline has a protective effect because it inhibits spore germination and a curative effect due to the inhibition of mycelial growth and sporulation of the fungus on the leaf surface. Headline works by first stopping the disease that is already present on the plant, and then by giving the plant protection against further disease infestation. Headline stops spores immediately upon germination and is systemic within the leaf. Headline applied to the top surface of the leaf binds tightly in the waxy cuticle and also moves to the lower surface where it provides dual-sided protection against disease entry. Because Headline can penetrate rapidly into the waxy layer of the leaf, it is very rainfast (one hour after application).

Effects of rainfall: Headline is rainfast within one hour of application.

- Grazing and Harvest Restrictions:** Do not graze treated corn crops within 6 days of application. Do not feed alfalfa hay or forage to livestock. All other crops listed can be grazed or fed to livestock.

Preharvest intervals: Cereals – apply no later than the end of flowering. Corn – 7 days. Edible-podded legumes and succulent beans and peas – 7 days. Grasses (grown for seed) – 14 days. Potatoes – 3 days. Dry bean and field peas, fababeans, and lentils – 30 days. Soybeans and flax – 21 days. Sugarbeets – 7 days.

Headline EC (cont'd)

10. **Toxicity:** Acute oral LD₅₀ (rats) >500 mg/kg. Acute dermal LD₅₀ (rats) >4,000 mg/kg. Treat symptomatically.
11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** Store in original, tightly closed container. Protect from freezing. Do not ship or store near food, feed, seed and fertilizers. Store in a cool, dry, locked, well ventilated area without a floor drain.
13. **Resistance Management:** See page 41 for information on resistance management.

Kumulus DF (sulfur)

Group M

Manufacturer: BASF Canada – Distributed through Engage Agro

1. **Formulations:** Water dispersible granular; 80% (PCP# 18836); 25 kg bag.
2. **Registered Mixes:** Polyram DE. Do not mix with dinitro compounds, tetradifon or oils.
3. **Crops*:** Field peas.
* See label for complete list of registered crops.
4. **Diseases Controlled:** Powdery mildew (field peas).
5. **When Used:** See "How to Apply."
6. **How to Apply:**

With: Ground equipment.

Water volume: Minimum of 40 L/ac. For peas, higher water volumes may be required later in the growing season.

Pressure: 275 - 345 kPa.

Nozzles: Hollow cones or flat fans recommended.

Rate:

Crop/disease	Rate	Notes
Peas		
powdery mildew	0.6 kg/ac	Spray at first appearance of disease and repeat at 7 - 10 day intervals as necessary.

7. **Application Tips:** Do not apply when rain or night frost is expected. Do not apply if temperature is above 27°C (in shade) and high humidity prevails or if any of the above conditions are expected within 3 days after the treatment. Treat when conditions are such that spray will dry on plants. Do not apply under intense sunshine. Do not apply when weather favours drift. Do not use within 30 days of an oil spray.
8. **How it Works:** A contact and protectant fungicide/acaricide.
9. **Grazing and Harvest Restrictions:** Do not apply later than 1 day before harvest.
10. **Toxicity:** Acute oral LD₅₀ (rats) = 2,200 mg/kg, Acute inhalation LC₅₀ (rats) = >5.4 mg/L per 4 hours.
11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** Store in cool, dry, well ventilated locked area without a floor drain.

Safety information, see page 25

Lance (boscalid)

Group 7

Manufacturer: BASF Canada

- 1. Formulations:** Water dispersable granular (WDG); 70% (PCP# 27495); 2 x 2.83 kg per case.
- 2. Registered Mixes:** Polyram DF or Bravo 500 for control of late blight in potatoes. Headline EC must be tank mixed with Lance for control of *Ascochyta* blight in chickpeas.
Note: Insecticides – for control of corn borer in succulent beans, Lance can be tank-mixed with Matador 120EC or Warrior at 0.034 L/acre. Apply before the larva bores into the plant stalks or pods.
- 3. Crops:** Alfalfa (seed production only), canola, chickpeas, dry and succulent beans, dry and succulent peas, fababeans, lentil, lupins, potatoes.
- 4. Diseases Controlled:**

Crop*	Disease
Alfalfa (seed production only)	Blossom blight (<i>Sclerotinia sclerotiorum</i> / <i>Botrytis cinerea</i>), common leaf spot (<i>Pseudopeziza medicaginis</i>), leaf spot (<i>Leptosphaerulina briosiani</i>), spring black stem (<i>Phoma medicaginis</i>)
Canola	Sclerotinia stem rot (<i>Sclerotinia sclerotiorum</i>), alternaria black spot** (<i>Alternaria brassicae</i> and <i>A. raphani</i>)
Chickpea*** and lentil	<i>Ascochyta</i> blight (<i>Ascochyta</i> spp.), gray mold (<i>Botrytis cinerea</i>), white mold (<i>Sclerotinia sclerotiorum</i>)
Dry beans	White mold (<i>Sclerotinia sclerotiorum</i>)
Dry peas	<i>Ascochyta</i> blight (<i>Ascochyta</i> spp.), gray mold (<i>Botrytis cinerea</i>), <i>Mycosphaerella</i> blight (<i>Mycosphaerella</i> spp.)
Fababeans	White mold (<i>Sclerotinia sclerotiorum</i>)
Potatoes	Early blight (<i>Alternaria solani</i>), late blight (<i>Phytophthora infestans</i>)
NOTE: For late blight Lance must be tank mixed with Polyram DF or Bravo 500 at label rates.	
Succulent beans (<i>Phaseolus</i> and <i>Vigna</i> spp.)	Gray mold (<i>Botrytis cinerea</i>), white mold (<i>Sclerotinia sclerotiorum</i>)
Succulent peas (<i>Pisum</i> spp.)	<i>Ascochyta</i> blight (<i>Ascochyta</i> spp.), white mold (<i>Sclerotinia sclerotiorum</i>), <i>Mycosphaerella</i> blight (<i>Mycosphaerella</i> spp.)

* Refer to the label for crops not detailed above.

** Use Lance at 20 - 50% flowering to suppress alternaria black spot. Apply at late flowering to early green pod stage to control alternaria black spot.

*** In chickpeas, Lance must be tank mixed with Headline EC for resistance management purposes.

5. When Used:

Alfalfa (seed production only): Apply at 20 - 50% flowering to control blossom blight (*sclerotinia*, *botrytis*), common leaf spot and spring black stem. Apply every 7 - 14 days if disease persists or weather conditions are favourable for disease development. Maximum three applications per season.

Canola: Apply at 20 - 50% flowering for control of *sclerotinia* and suppression of *alternaria* black spot. Apply a second time 7 - 14 days later up to full bloom if disease persists, or weather conditions are favourable for disease development. For control of *alternaria* black spot apply at late flowering to the early green pod stage.

Chickpea: Apply Lance tank mixed with Headline EC at the beginning of flowering **or** at the onset of the disease symptoms for control of *Ascochyta* blight in chickpeas.

Dry beans and fababeans: Apply at 20 - 50% flowering. Apply a second time 7 - 14 days later if disease persists, or if weather conditions are favourable for disease development. Use the higher rate to obtain

Safety information, see page 25

Lance (cont'd)

extended protection and maximum yield benefit.

Dry peas: Apply at the beginning of flowering. Apply a second time 7 - 14 days later if disease persists, or if weather conditions are favourable for disease development.

Lentil: Apply at the beginning of flowering. Apply a second time 7 - 14 days later if disease persists, or if weather conditions are favourable for disease development.

Potatoes: For early blight, begin applications of Lance WDG prior to disease development and continue applications at 14 day intervals if conditions are favourable for disease development. Lance WDG fungicide does not control late blight when applied alone and must be tank mixed with either Polyram DF or Bravo 500, which are registered for late blight control. Begin applications prior to late blight development. Do not apply more than 4 times per season on potatoes.

Succulent beans: Apply at 20 - 50% flowering. Apply a second time 7 - 14 days later if disease persists, or if weather conditions are favourable for disease development.

Succulent peas (edible and shelled): Begin applications prior to disease development or at the beginning of flowering and repeat on a 5 - 14 day interval if conditions are conducive for disease development. Use a higher rate and shorter interval when disease pressure is high.

6. How to Apply:**With:**

Ground or aerial application: Alfalfa (seed production only), canola, chickpea, dry beans, fababeans, lentil and potatoes.

Ground application only*: Edible-podded, succulent and dry peas, succulent beans.

* See label for application of other crops on label.

Pivot or sprinkler irrigation: Alfalfa, canola, dry beans, fababeans, potatoes.

Rate:

Alfalfa (seed production only): 170 g/ac.

Canola: 142 g/ac.

Chickpea: For the control of Ascochyta blight, apply Lance at 146 - 170 g/ac tank mixed with Headline EC at 0.16 - 0.24 L/ac.

Dry beans and fababeans: 227 - 312 g/ac – use the higher rate to obtain extended protection and maximum yield benefit.

Dry peas: 170 g/ac for Ascochyta and Mycosphaerella blights, Botrytis grey mold control.

Lentil: 170 g/ac.

Potatoes: 70 - 128 g/ac – use the high rate under severe disease conditions. For late blight control, apply 70 - 128 g/ac in tank mix with either Polyram DF or Bravo 500. Refer to the respective tank mix partner labels for product rates, additional recommendations, restrictions and precautions.

Succulent beans: 170 g/ac for Botrytis grey mold; 227 - 312 g/ac for white mold control.

Succulent peas: 170 g/ac for Ascochyta and Mycosphaerella blight; 227 - 312 g/ac for white mold control.

Water volume:

Aerial application: Minimum of 16 L/ac. Ensure thorough coverage of foliage.

Ground application: Minimum of 40 L/ac.

For pivot and sprinkler irrigation applications: Do not exceed 0.64 cm (1/4 inch) or 63,500 L/hectare (25,709 L/ac).

Pressure: Consult nozzle manufacturers' recommendation for spray pressures for specific nozzles.

- 7. Application Tips:** Clean the spray tank following sprayer clean-up recommendations on the label of the product applied previously. Fill the spray tank 1/2 full with clean water and begin vigorous agitation. Add the specified amount of Lance WDG fungicide to the tank. Continue agitation while filling the tank to the desired volume to obtain the required spray concentration. Maintain vigorous agitation throughout the

Safety information, see page 25

spraying operation. If spray solution sits in the tank for more than one hour without being sprayed out, make sure it is in solution prior to subsequent application. Do not tank mix with any other products. Good coverage is essential for effective disease control. Any reduction in water volume can reduce disease control.

For sprinkler irrigation applications: Apply only through sprinkler systems including centre pivot, lateral move, end tow, side (wheel) roll, traveler, big gun, solid set or hand move irrigation systems. Do not apply when wind speed favors drift beyond the area intended for treatment. Do not spray non-target terrestrial or aquatic habitats.

As with all fungicides, Lance works better if it is applied in a preventative manner and performs best if applied in a regularly scheduled protective spray program. Maximum number of applications per season: alfalfa (seed production only) – 3; canola, chickpeas, dry and succulent beans, dry and succulent peas, lentil – 2; potatoes – 4. Do not apply to any body of water. Avoid drifting of spray onto any body of water or other non-target areas. Specified buffer zones as per label should be followed.

Note: Do not apply in greenhouses.

8. **How it Works:** Lance provides a protective effect because it inhibits spore germination on plant surfaces. Optimum disease control is achieved when Lance WDG fungicide is applied in a regularly scheduled preventive spray program and is used as a protective application.

Effects of rainfall: Do not apply if rain is likely to occur within 3 hours of spraying. Avoid irrigation for 24 hours after application.

9. **Grazing and Harvest Restrictions:** For alfalfa grown for seed production: **Do not** graze or feed treated hay to livestock. All other crops on label can be grazed or fed to livestock.

Preharvest intervals: Canola, chickpeas, dry beans, fababeans, lentil, peas – 21 days; potatoes – 30 days; succulent beans and peas – 7 days. For all other labeled crops, please refer to the label. Do not re-enter treated area for 4 hours after application or until dry.

Crop rotation restrictions: Labelled crops can be planted immediately following application. All other crops can be planted 14 days after the last application.

10. **Toxicity:** Acute oral LD₅₀ (rats) >2,000 mg/kg/bw. Acute dermal LD₅₀ (rats) >2,000 mg/kg/bw. Treat symptomatically.

11. **Precautions, First Aid:** Check label for first aid information.

12. **Storage:** Store in original, tightly closed container. Do not ship or store near food, feed, seed and fertilizers. Store in a cool, dry, locked, well ventilated area without a floor drain.

13. **Resistance Management:** See page 41 for information on resistance management.

Parasol/Kocide 2000

(copper hydroxide)

Group M

Manufacturer: Nufarm Agriculture Inc./E.I. duPont Canada Co.

1. **Formulations:** **Parasol:** Wettable powder; 50% (PCP# 24671); 10 kg bags. Flowable; 24.4 %, (PCP# 25901); 2 x 10 L jugs. Wettable granules; 50% (PCP# 29063); 10 kg bags. **Kocide 2000:** Dry flowable; 53.8% (PCP# 27348); 2 x 80 L jugs.
2. **Registered Mixes:** Mancozeb. Parasol maybe recommended in tank mix with other products; follow all instructions for mixing, spraying precautions, limitations, crop rotations, application timing, pre-harvest intervals, etc. on labels of products tank mixed with Parasol. Kocide 2000: Manzate DE.
3. **Crops*:** Beans, potatoes, sugarbeets.

* See label for complete list of registered crops.

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Parasol/Kocide 2000 (cont'd)

- 4. Diseases Controlled:** Bacterial blight, Halo blight, common blight (beans), Cercospora leaf spot (sugarbeets)*, early blight (potatoes), late blight (potatoes).

* Registered for Parasol only.

5. When Used:

Potatoes: Apply when plants are 15 cm high; apply at 7 - 10 day intervals; Parasol WP or FL may be applied at vine kill with a desiccant or alone after vine kill, prior to harvest.

Beans: Apply when plants are 15 cm high; repeat at 7 - 14 day intervals.

Sugarbeets: Begin applications when disease threatens; repeat every 10 - 14 days.

Cucumbers: Apply weekly once plants begin to vine.

Tomatoes/peppers: Apply when disease threatens; repeat every 7 - 10 days.

6. How to Apply:

Water volume: Enough to ensure complete coverage.

Rate: Use high rates if conditions favour disease or if crop canopy is dense.

Crop	Parasol WP	Parasol FL	Parasol WG	Kocide 2000
Beans	0.9 - 1.3 kg/ac	0.93 - 1.3 L/ac	0.9 - 1.3 kg/ac	—
Potatoes	0.45 - 1 kg/ac	0.32 - 0.73 L/ac	0.45 - 1 kg/ac	0.32 - 0.65 kg/ac
Potatoes (vine kill)	1.38 kg/ac	1.0 L/ac	8.4 kg/ac	0.97 kg/ac
Sugarbeets	0.9 - 1.8 kg/ac	—	0.9 - 1.8 kg/ac	—

- 7. Application Tips:** Continuous agitation is recommended.

- 8. How it Works:** A contact fungicide.

- 9. Grazing and Harvest Restrictions:** Pre-harvest intervals: All crops can be harvested one day after application.

- 10. Toxicity:** Low mammalian toxicity.

- 11. Precautions, First Aid:** Check label for first aid information.

- 12. Storage:** Store in a cool, dry, well ventilated area out of reach of children and animals.

Polyram DF (metiram)

Group M

Manufacturer: BASF Canada - Distributed through Engage Agro



Warning Corrosive

- 1. Formulations:** Dry flowable; 16% (PCP# 25867); 20 kg bag.
- 2. Registered Mixes:** Polyram DF can be mixed with Diazinon or Malathion. Tank mix should be sprayed out immediately.
- 3. Crops:** Potatoes.
- 4. Diseases Controlled:** Early blight and late blight (potatoes).
- 5. When Used:** See "How to Apply."
- 6. How to Apply:**
 - With:** Aircraft, ground equipment.
 - Water volume:** Aircraft: 22 L/ac; Ground: 40 - 80 L/ac.
 - Pressure:** 275 - 345 kPa.
 - Nozzles:** Hollow cones or flat fans recommended.

Safety information, see page 25

Rate:

Crop/disease	Formulation	Quantity/when to use
Potato (foliar spray)		
Early and late blight	Polyram DF	At 7 - 10 day intervals 0.45 - 0.71 kg/ac until plants cover the row. Then increase to 0.9 kg/ac until tops are killed or use 0.45 - 0.71 kg/ac at 5 - 7 day intervals starting when plants are 15 cm high and continue until top killing. When conditions (rain or dew) favour infections, use the shorter intervals in each case.

7. **Application Tips:** See "How to Apply."
8. **How it Works:** A contact and protectant fungicide.
9. **Grazing and Harvest Restrictions:** Do not feed treated forage to livestock. Do not apply when environmental conditions may cause drift from the treatment area. Harvest intervals (days): Carrots (7), celery (14), grapes (45), potatoes (1), sugar beets (21), tomatoes (7).
10. **Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) technical >5,000 mg/kg.
11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** Store in a cool, dry, ventilated place. Do not allow product to become wet or overheated as this will reduce its effectiveness and may create flammable vapours.
13. **Resistance Management:** See page 41 for information on resistance management.

Proline 480 (prothioconazole)

Group 3

Manufacturer: Bayer CropScience Inc.

1. **Formulations:** SC formulation; 480 g/L prothioconazole (PCP# 28359); 5.1 L jug.
2. **Registered Mixes:** None.
3. **Crops:** Barley, canola, chickpeas, crambe, flax, lentils, oriental mustard, rapeseed, wheat (spring, durum and winter).
4. **Diseases Controlled:** **Barley:** Net blotch, scald, spot blotch. Suppression of Fusarium head blight (scab). **Canola, crambe, flax, oriental mustard and rapeseed:** Sclerotinia stem rot. **Chickpea:** Ascochyta. **Lentils:** Ascochyta. **Wheat:** Glume blotch, speckled leaf blotch, tan spot, leaf rust. Suppression of Fusarium head blight (scab).
5. **When Used:**

Leaf diseases in wheat or barley: Apply Proline 480 as a preventative foliar spray when the earliest disease symptoms appear on the leaves and stems. Barley and wheat fields should be observed closely for early disease symptoms, particularly when susceptible varieties are planted and/or under prolonged conditions favorable for disease development.

Fusarium head blight in wheat or barley: Head blight is extremely difficult to control. For that reason, only suppression of Fusarium head blight (scab) is claimed.

Timing of application is critical: For optimum suppression of Fusarium head blight, apply Proline 480 SC within the crop stage or time period specified for either barley or wheat in "How to Apply." Fusarium head blight outbreaks occur when the weather is warm and wet at head emergence and flowering. The application of Proline 480 SC for protection against Fusarium head blight (scab) should be considered when these environmental conditions are forecasted for this stage of wheat or barley development.

Safety information, see page 25

Proline 480 (cont'd)

Application of the 170 mL/ac rate is suggested in situations where disease pressure is expected to be high. Such situations may occur when prolonged periods of warm, wet weather are forecast in combination with wheat flowering or barley head emergence, when corn has been included previously in crop rotation or when susceptible cereal cultivars or wheat types (i.e. durum) are grown.

Sclerotinia: Apply Proline 480 SC when the canola crop is in the 20 - 50% bloom stage, preferably prior to initial petal drop.

Ascochyta: Apply Proline 480 SC at the first sign of disease development in chickpeas or lentils.

- 6. How to Apply:** Ground equipment in all registered crops. Aerial application permitted in canola, rapeseed or oriental mustard.

Rate: See *Crop, Disease and Rate* chart below. Ensure addition of lowest labeled rate of a non-ionic surfactant, AgSurf or Agral 90.

Crop	Disease	Rate (mL/ac)	Timing
Barley	For suppression of: Fusarium head blight (<i>Fusarium</i> spp.) or scab	128 - 170 Apply with a non-ionic surfactant, AgSurf or Agral 90 at 0.125% v/v.	For optimal suppression of Fusarium head blight, apply Proline as a preventative spray when 70 - 100% of the barley main stem heads are fully emerged, to 3 days after full head emergence. Timing of application is critical – see "When Used" for additional information. Application of the 170 mL/ac rate is suggested in situations where disease pressure is expected to be high. Use of the 170 mL/ac rate will typically provide the highest levels of mycotoxin reduction. Spray coverage is essential for optimum efficacy – see "Application Tips."

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Crop	Disease	Rate (mL/ac)	Timing
Barley leaf diseases	For control of: Net Blotch (<i>Pyrenophora teres</i>) Scald (<i>Rhynchosporium secalis</i>) Spot blotch (<i>Cochliobolus sativus</i>)	85 - 128 Apply with a non-ionic surfactant, AgSurf or Agral 90 at 0.125% v/v.	Observe crop closely, and apply Proline as a preventative foliar spray when the earliest disease symptoms appear on the leaves and stems.
Wheat (spring, durum and winter)	For suppression of: Fusarium head blight (<i>Fusarium</i> spp.) or scab For control of: Glume blotch (<i>Stagonosora nodorum</i>)	128 - 170 Apply with a non-ionic surfactant, AgSurf or Agral 90 at 0.125% v/v.	For optimal suppression of Fusarium head blight or control of glume blotch, apply Proline as a preventative spray when at least 75% of the wheat heads on the main stem heads are fully emerged, to when 50% of the heads on the main stem are in flower. Timing of application is critical – see "When Used" for additional information. Application of the 170 mL/ac rate is suggested in situations where disease pressure is expected to be high. Use of the 170 mL/ha rate will typically provide the highest levels of mycotoxin reduction. Spray coverage is essential for optimum efficacy – see "Application Tips."

Safety information, see page 25

Wheat leaf diseases (spring, durum and winter)	For control of: Speckled leaf blotch (<i>Septoria tritici</i>)	128	Observe crop closely, and apply Proline as a preventative foliar spray when the earliest disease symptoms appear on the leaves and stems.
	Tan spot (<i>Pyrenophora tritici-repentis</i>) Leaf rust (<i>Puccinia recondita</i>)	Apply with a non-ionic surfactant, AgSurf or Agral 90 at 0.125% v/v.	
Canola, rapeseed or oriental mustard	For control of: Sclerotinia stem rot (<i>Sclerotinia sclerotiorum</i>)	128 - 149	Apply Proline when the canola crop is in the 20 - 50% bloom stage. Best protection will be achieved when the fungicide is applied prior to petals beginning to fall and will allow for the maximum number of petals to be protected. The 149 mL/ac rate is recommended for fields with a history of heavy disease pressure or for dense crop stands. Good spray coverage of the plants is essential.
Chickpeas	For control of: Ascochyta blight (<i>Ascochyta rabiei</i>)	128 - 170*	Apply Proline at the first sign of disease. Maximum three applications per year.
Lentils	For control of: Ascochyta blight (<i>Ascochyta spp.</i>)	128 - 170*	Apply Proline at the first sign of disease. Maximum two applications per year.

* May be applied with the lowest labeled rate of a non-ionic surfactant, AgSurf or Agral 90.

- 7. Application Tips:** Half fill spray or mixing tank with water and start agitation. Add required quantity of Proline 480 and complete filling tank with water to the required total volume. Maintain agitation throughout mixing and spraying. Proline 480 SC should be thoroughly dispersed prior to the addition of a non-ionic surfactant. Proline 480 SC is recommended for use with Agral 90 or AgSurf at 0.125% v/v when used in barley and wheat.

Spray coverage is essential: Ensure thorough coverage of all wheat or barley heads for optimal suppression of Fusarium head blight. Ensure thorough coverage of plant foliage and/or flower petals for other diseases controlled by Proline.

- 8. How it Works:** Proline 480 is a broad spectrum systemic fungicide for the control or suppression of listed Ascomycetes, Basidiomycetes and Dueteromycetes diseases on chickpeas, lentils, canola, rapeseed, oriental mustard, wheat and barley.

9. Harvest or Application Restrictions:

Pre-harvest interval (days): Barley (30), canola, rapeseed or oriental mustard (36), chickpeas or lentils (7), wheat (30).

Number of applications: A maximum of one application (149 mL/ac) in canola, rapeseed or oriental mustard. A maximum of three applications (totalling 510 mL/ac) per crop year for chickpeas. A maximum of two applications (totalling 340 mL/ac) per crop year for lentils. A maximum of two applications (totalling 298 mL/ac) of Proline 480 SC, with a minimum 7 day application interval, may be applied to barley or wheat per crop year.

- 10. Toxicity:** Acute Oral LD₅₀ (female rat) >2,000 - <5,000 mg/kg.

- 11. Precautions, First Aid:** Check label for first aid information.

Proline 480 (cont'd)

- 12. Storage:** Store in a cool dry place and in such a manner as to prevent cross contamination with other pesticides, fertilizers, food, feed, plants or water. Keep away from fire, open flame or other sources of heat. Store in original container and out of the reach of children, preferably in a locked storage area. Do not use or store in or around the home. Do not contaminate water, food or feed by storage or disposal. If stored for one year or longer, shake well before using. Do not store at temperatures below freezing.
- 13. Resistance Management:** See page 41 for information on resistance management.

Quadris (azoxystrobin)

Group 11

Manufacturer: Syngenta Crop Protection Canada Inc.

- 1. Formulations:** Flowable; suspension concentrate; 250 g/L azoxystrobin (PCP# 26153); 4 x 3.78 L.
- 2. Registered Mixes:** Bravo 500 for control of early blight in potatoes, ascochyta blight in chickpeas. Matador. Tilt in barley and wheat.
- 3. Crops:** Beans (excluding soyabeans), canola, chickpeas, coriander, lentils, lupins, peas, potatoes, tomatoes.
- 4. Diseases Controlled:** Alternaria black spot, Anthracnose, Ascochyta, blossom blight, Mycosphaerella blight, Sclerotinia stem rot, virulent blackleg. In-row control of silver scurf (*Helminthosporium solani*) in potatoes.
- 5. When Used:**
Alternaria black spot: Apply at early pod stage (90% petal drop).
Sclerotinia stem rot: Apply at early bloom (prior to 30% bloom; this timing will also suppress Alternaria black spot.).
Virulent blackleg: Apply at the 2 - 6 leaf stage of the canola.
- 6. How to Apply:**
With: Aircraft or ground equipment.
Rate:

Crop	Diseases controlled	Product rate (mL/ac)	Application timing	Notes
Canola	Virulent blackleg (<i>Leptosphaeria</i>)	202	1 application as a broadcast foliar spray at 2 - 6 leaf stage.	
	Sclerotinia stem rot	282 - 404*	1 application as a broadcast foliar spray at the early bloom stage (prior to 30% bloom).	Use the higher rate if there is a history of Sclerotinia infection in the area, and when environmental conditions favor disease development.
	Alternaria black spot (<i>Alternaria brassicae</i> , <i>Alternaria raphani</i>)	202	1 application as a broadcast foliar spray at the pod stage (90% petal fall).	
	Alternaria black spot (<i>Alternaria brassicae</i> , <i>Alternaria raphani</i>)	282 - 404	Early bloom stage (prior to 30% bloom); same application timing as Sclerotinia stem rot.	Application at this staging results in suppression only.

Safety information, see page 25

Chickpeas, dry beans, lentils, peas	Ascochyta blight (<i>Ascochyta</i> spp.) Mycosphaerella blight (<i>Mycosphaerella pinodes</i>) Anthracnose (<i>Colletotrichum</i> spp.)	202	1st application at the first sign of disease and no later than the onset of flowering, followed by a 2nd application 10 - 14 days after the 1st application.	1st application of Quadris must be applied before disease is established. Make no more than 2 applications when disease pressure is high, or when weather conditions are conducive to disease development or movement.
Coriander	Blossom blight (<i>Aureobasidium</i> spp.)	183 - 455	Apply 1 application per season prior to disease establishment. Apply with minimum 40 L/ac water with ground boom sprayer.	Use higher rate at high disease pressure.
Potatoes	Early blight (<i>Alternaria solani</i>)	202 - 324	Apply on a 7 to 14 day interval, starting prior to disease establishment.	For early blight , use the high rate and short application interval under high disease pressures. If late blight becomes established, discontinue use of Quadris Flowable fungicide, and use alternative fungicides.
	Late blight (<i>Phytophthora infestans</i>)	324		
	Silver scurf (<i>Helminthosporium solani</i>)	4 - 6 mL product/ 100 m row	Apply once as an in furrow spray in 50 to 140 L per hectare of water at planting.	Mount the spray nozzle so the spray is directed into the furrow as a 15 - 20 cm band just before the seed is covered.

* Use higher rates for fields with Sclerotinia history or crops under severe or prolonged disease conditions, high humidity or excessive rainfall.

Water volume: Aerial application: Minimum of 18 L of water per acre.

Ground application: Sufficient water to ensure thorough coverage of foliage, (at least 40 L/ac). Use sufficient water volumes for good coverage.

Pressure: 275 kPa (40 psi).

Caution: Quadris fungicide has been shown to be extremely phytotoxic to certain apple varieties. Quadris should not be applied where there is the possibility of spray drift reaching apple or crabapple trees.

Do not use sprayers used to apply Quadris fungicide to spray apples or crabapples.

7. Application Tips: Partially fill the spray tank with clean water and begin agitation. Add the specified amount of Quadris to the tank. Finish filling the tank to the desired volume for the required spray concentration; maintain agitation. Maintain agitation throughout the spraying operation. If the spray mixture stands for a prolonged period (i.e. overnight), vigorous agitation may be required to re-suspend the solution.

8. How it Works: Quadris fungicide is a broad spectrum, preventative fungicide with systemic properties.

Effects of rainfall: Do not apply if rainfall is imminent.

9. Grazing and Harvesting Restrictions: Do not apply within 30 days of harvest.

Plant back intervals (days): Broadleaf and root crops (30); cereals (45).

10. Toxicity: Low oral toxicity. Acute oral LD₅₀ (rats) = >5,000 mg/kg. This product is unlikely to cause harmful effects under normal conditions of handling and use. No specific symptoms are known for this product. If ingested, nausea, vomiting, diarrhea and abdominal pain may occur. Treat symptomatically.

11. Precautions, First Aid: Check label for first aid information.

12. Storage: Keep in tightly closed original container during storage. Store in cool, dry, well ventilated area away from feed and foodstuffs and out of reach of children and animals. Do not store below 0°C.

13. Resistance Management: See page 41 for information on resistance management.

Safety information, see page 25

Quilt (azoxystrobin + propiconazole)

Group 11,3

Manufacturer: Syngenta Crop Protection Canada Inc.

1. **Formulations:** Suspension; 75 g/L azoxystrobin, 125 g/L propiconazole (PCP# 28328); 2 x 10.13 L jugs.
2. **Registered Mixes:** Matador 120EC, Warrior.
3. **Crops:** Legume vegetables, barley, spring wheat, winter wheat, field corn, sweet corn.
4. **Diseases Controlled:** Asian rust, net blotch, scald, septoria leaf spot, tan spot, stripe rust, leaf rust, rust, leaf blight, eye spot, leafspot, powdery mildew.
5. **When Used:**

Wheat, barley: Apply once between stem elongation and half-head emergence.

Corn: Make first application at the first sign of disease. A second application can be made 14 days after the first if environmental conditions are favourable for disease development.
6. **How to Apply:**

With: Aircraft or ground equipment.

Rate*: Barley, wheat (spring and winter varieties), corn: 300 mL/ac. For barley leaf rust, use 400 mL/ac.
* For all other registered crops, refer to label.

Water volume: Ground equipment: 40 L/ac. Aircraft: 18 L/ac.
7. **Application Tips:** Thorough coverage of plant parts prior to infection is essential for effective disease control. Quilt should be applied using standard aerial equipment or ground equipment and practices. When applying by air, treat when wind is less than 16 kilometers per hour. For ground application, do not apply during periods of dead calm or gusty winds. For cereals, do not make more than one application per season. For corn, do not apply more than two applications per season.
8. **How it Works:** Quilt consists of two fungicides, which both have systemic properties and have different modes of action. It has both preventative and curative activity.
Effects of rainfall: Do not apply if rainfall is imminent.
9. **Grazing and Harvest Restrictions:** Do not rotate to any crop intended for food, grazing or any component of animal feed or bedding within 105 days of applying Quilt unless the second crop appears on the Quilt label. Do not use hay, forage or fodder from a crop treated with Quilt or as any component of feed or bedding for animals.
10. **Toxicity:** Ingestion = 1,750 mg/kg (rat) – slightly toxic. Dermal = >5,000 mg/kg (rat) – practically non-toxic.
11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** Store in a cool, dry, well ventilated space away from feeds and foods. Do not store below zero degrees Celcius.
13. **Resistance Management:** See page 41 for information on resistance management.

Ranman (cyazofamid)

Group 21

Manufacturer: ISK Biosciences Corp./United Agri Products Canada Inc. (distributor)

1. **Formulations:** Soluble concentrate; 400 g/L cyanofamid (PCP# 27984); 4 x 3.79 L.
2. **Registered Mixes:** None.

Safety information, see page 25

3. **Crops:** Potatoes.
4. **Diseases Controlled:** Late blight.
5. **When Used:** For late blight control, make Ranman 400SC applications on a 7 day schedule beginning when warning systems forecast disease infection periods, generally at row closure or when conditions are favourable for the disease.
6. **How to Apply:**
 - Rate:** 40 to 80 mL/ac.
 - With:** Ground equipment only.
 - Water volume:** Ground equipment: 81 - 243 mL/ac depending on plant growth.
 - Ranman should be tank mixed with Sylgard 309 at 0.06 L/ac.**
7. **Application Tips:** Use the low rate (40 mL product/acre) for preventative applications or very low disease pressure, increasing the rate as disease pressure and/or fast crop development increases, up to a maximum rate (80 mL product/acre). For late blight tuber rot control, ensure that the last 2 - 3 applications of Ranman 400SC prior to desiccation are made at the maximum rate (80 mL product/acre) following resistance management practices. After one application, alternate Ranman 400SC fungicide with at least one application of fungicide having a different mode of action for control of late blight.
8. **How it Works:** The active ingredient cyanofamid is a member of the cyanofamidazole class of chemistry and has preventative and protectant activity. Although Ranman 400SC has limited systemic activity, it should be treated as a protectant fungicide and applied before the disease enters the crop.
9. **Grazing and Harvest Restrictions: Preharvest interval:** 7 days.
 - Recropping:** A 30 day plant back interval (PBI) is required.
 - Applications:** Maximum of 6 applications per season.
10. **Toxicity:** Acute oral LD₅₀ in rats >5,000 mg/kg.
11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** Store product in original container in a secured, dry place separate from other pesticides, fertilizer, food and feed.
13. **Resistance Management:** See page 41 for information on resistance management.

Reason 500 SC (fenamidone)

Group 11

Manufacturer: Bayer CropScience Inc.

1. **Formulations:** Flowable; suspension concentrate; 500 g/L fenamidone (PCP# 27462); 2, 4 or 10 L.
2. **Registered Mixes:** Bravo, Dithane. Reason 500 SC to be applied **only** when tank mixed with Bravo or Dithane.
3. **Crops:** Potatoes.
4. **Diseases Controlled:** Early blight, late blight.
5. **When Used:** Application of Reason 500 SC for control of late blight should begin when plants are 15 - 20 cm high or when disease threatens (whichever comes first). Apply a fungicide having a different mode of action within 7 - 10 days after each application of Reason 500 SC.
 - Timing of application:** When Reason 500 SC is applied alone, use the shorter spray interval when conditions favor disease development. Follow the recommended spray interval for each fungicide application before proceeding with the next application. Do not apply Reason 500 SC, alone or in tank mix, more than 6 times in a year.

Safety information, see page 25

Reason 500 SC (cont'd)

6. How to Apply:

With: Aircraft or ground equipment.

Rate: 80 mL/ac + 500 g/ac Dithane DG or 500 mL/ac Bravo 500.

Water volume:

Ground: Minimum 90 L/ac; enough to ensure complete coverage.

Aerial: Minimum 15 L/ac; enough to ensure complete coverage.

Pressure: Minimum 275 kPa with ground equipment. Minimum of 300 kPa by air.

7. Application Tips: Reason 500 SC should be applied as a preventative disease control measure. Good coverage is essential for effective disease control. Any reduction in water volume can reduce disease control.

8. How it Works: Reason 500 SC is a preventative, protectant fungicide, which inhibits spore germination and acts as an anti-sporulant.

9. Grazing and Harvest Restrictions: Pre-harvest interval 14 days.

10. Toxicity: Oral LD₅₀ (rats) fenamidone = 750 mg/kg.

11. Precautions, First Aid: Check label for first aid information.

12. Storage: Store container in a cool, dry place away from feeds, seeds, fertilizers, plants and foodstuffs. Keep leftover product in original container, tightly closed, in a safe place. Do not use or store in or around the home. Keep away from fire or open flame or other sources of heat. If stored for 1 year or longer, shake well before using. **Cannot be stored below freezing.**

Revus (mandipropamid)

Group 40

Manufacturer: Syngenta Crop Protection Canada Inc.

1. Formulations: Suspension concentrate; 250 g/L mandipropamid (PCP# 29074); 4 x 3.78 L jugs.

2. Registered Mixes: Bravo 500.

3. Crops*: Potatoes.

* See label for complete list of registered crops.

4. Diseases Controlled*: Late blight.

* See label for complete list of controlled diseases.

5. When Used*: Application of Revus for control of late blight should begin prior to disease development and continue throughout the season on a 7 - 10 day cycle, following good resistance management guidelines. Do not exceed four applications per season with Revus fungicide.

* See label for use instructions for other registered crops.

6. How to Apply:

With: Aircraft or ground equipment.

Rate: 160 - 240 mL/ac.

Water volume:

Ground: Minimum 40 L/ac, enough to ensure complete coverage.

Aerial: Minimum 18 L/ac, enough to ensure complete coverage.

Surfactant: Non-ionic adjuvant at 0.125% recommended for use on potatoes.

Do not re-enter treated area within 12 hours.

Safety information, see page 25

7. **Application Tips:** Apply Revus fungicide using sufficient water volume to provide thorough and uniform spray coverage. In situations where a dense canopy exists and/or pest pressure is high, use greater water volumes.
8. **How it Works:** After application, Revus adheres to the waxy cuticle of treated leaves, quickly becoming rainfast and establishing a barrier to prevent fungi from taking hold. The fungicide also enters the leaf to provide protection to both sides of the leaf. Revus also provides anti-germination effects; therefore, disease spores that land on the plant are prevented from germinating.
9. **Grazing and Harvest Restrictions:** Pre-harvest interval 14 days.
10. **Toxicity:** Oral toxicity LD₅₀ (female rat) >5,000 mg/kg. Dermal toxicity LD₅₀ (rat) >5,000 mg/kg.
11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** Store container in a cool, dry place away from feeds, seeds, fertilizers, plants and foodstuffs.
13. **Resistance Management:** See page 41 for information on resistance management.

Ridomil Gold/Bravo

(chlorothalonil + metalaxyl)

Group M,4

Manufacturer: Syngenta Crop Protection Canada Inc.



Warning Poison

1. **Formulations:** Liquid; 500 g/L chlorothalonil + 480 g/L metalaxyl (PCP# 26443); 2 x (0.83 L + 8 L).
2. **Registered Mixes:** None. Do not tank mix with a top killer (crop desiccant).
3. **Crops:** Potatoes.
4. **Diseases Controlled:** Botrytis vine rot, early blight, late blight, late blight tuber rot.
Fungi suppressed: Pythium leak and pink rot.
5. **When Used:** It is recommended that Bravo/Ridomil be used within an Integrated Pest Management Program, (sound seed, field selection and rotation, field monitoring, use program of recommended contact fungicides).

For Botrytis vine rot, early blight, late blight, late blight tuber rot, Pythium leak and pink rot:

Apply early in the season when conditions are favorable for disease (**before disease infection**), but no later than when plant foliage meets within the row uniformly across the field. Apply a second and third application of Ridomil Gold/Bravo at 14-day intervals. The label rate of a registered contact fungicide should be applied 7 days after each Ridomil Gold/Bravo application. Following the last application of Ridomil Gold/Bravo, apply the labelled registered contact fungicide at its recommended timing throughout the remainder of the season.

Note: If applications of Ridomil Gold/Bravo fungicide are made for control of foliar diseases, additional applications of tuber disease control are not needed.

6. How to Apply:

With: Aircraft or ground equipment.

Water volume: Ground: Minimum of 91 L water/ac. Air: Minimum of 20 L water/ac.

Pressure: 275 kPa.

Nozzles: Flat fan. Spray screens should be no finer than 50 mesh. For aerial application, adjust nozzles to provide a medium droplet size of 200 - 400 microns. Sprays: Do not let tank contents stand for prolonged periods without agitation.

Ridomil Gold/Bravo (cont'd)

Rate: One 8.83 L jug will treat 10 acres. Do not attempt to measure from this jug. The entire contents must be added to the spray tank or an improper mixture will result.

- 7. Application Tips:** Do not contaminate bodies of water through application sprays, cleanup or runoff. Do not apply when weather conditions favour drift from treated areas. Consult local authorities as to the determination of adequate buffer zones. Not recommended for disease control in greenhouses.
- 8. How it Works:** Bravo/Ridomil is a combination of a systemic and contact fungicide. It has both preventative and curative activity against fungi of the order Peronosporales – this includes the late blight fungus.
- 9. Grazing and Harvest Restrictions:** Do not feed to livestock. Do not make more than 3 applications per season regardless of the disease being treated.
- 10. Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) chlorothalonil = 10,000 mg/kg, metalaxyl = 669 mg/kg.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store in a dry, heated area and maintain above 0°C. Keep away from sources of heat. Avoid storage with food or feed.
- 13. Resistance Management:** See page 41 for information on resistance management.

Ridomil Gold MZ 68WP

(metalaxyl + mancozeb)

Manufacturer: Syngenta Crop Protection Canada Inc.

Group 4,M



Warning Poison

- 1. Formulations:** Wettable powder; 8% metalaxyl + 64% mancozeb; 4% metalaxyl + 64% mancozeb (PCP# 25379); 4 x 5 kg.
- 2. Registered Mixes:** None. Do not tank mix Ridomil MZ with a top-killer (crop desiccant).
- 3. Crops*:** Potatoes.
* See label for complete list of registered crops.
- 4. Diseases Controlled:** Early blight, late blight and late blight tuber rot in potatoes.
Fungi suppressed: Pink rot and Pythium leak in potatoes.
- 5. When Used: Early and late blight on the foliage of potatoes and suppression of Pythium leak and pink rot:** Apply before the outbreak of disease. Apply up to 3 applications in sufficient water to ensure thorough coverage of foliage. Start application early – the first application should be applied before the leaves of the plants touch in the potato row. Apply a second and third application of Ridomil MZ at 10 - 14 day intervals. Apply a contact fungicide recommended for control of late blight 5 - 7 days after each Ridomil MZ application. Following the final Ridomil MZ application, apply a contact fungicide recommended for late blight control at the recommended rate and interval to the end of the season.
Use limitations: Discontinue use when potato vines start to look mature.
- 6. How to Apply:**
With: Aircraft or ground equipment.
Rate: 1 kg/ac.
Water volume:
Ground: Sufficient water to ensure thorough coverage of foliage.
Air: Minimum of 20 L of water per acre.

Safety information, see page 25

Pressure: 275 kPa.

Nozzles: Flat fan. Spray screens should be no finer than 50 mesh. For aerial application, adjust nozzles to provide a medium droplet size of 200 - 400 microns.

Sprays: Do not let tank contents stand for prolonged periods without agitation. Ensure bypass line discharges at the bottom of the tank to minimize foaming.

- 7. Application Tips:** Apply as part of a preventative disease management program. Cultural practices to minimize the sources of disease should be used as well as early preventative applications of fungicides. Under severe late blight conditions, the shorter 10-day interval is recommended. When changing from Ridomil MZ to a contact fungicide, apply within 5 - 7 days of the last Ridomil MZ application. Avoid application when weather conditions favour drift from treated areas.
- 8. How it Works:** Ridomil MZ is a combination of a systemic and contact fungicide. It has both preventative and curative activity against fungi of the order Peronosporales – this includes the late blight fungus.
- 9. Grazing and Harvest Restrictions:** Do not feed to livestock. Do not apply within 14 days of lettuce harvest or 7 days of onion harvest. Do not make more than 3 applications per season regardless of the disease being treated. Do not re-enter the treated areas within 12 hours.
- 10. Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) mancozeb = 8,000 mg/kg; metalaxyl = 669 mg/kg. In order to minimize risk to the environment from the use of this product, do not use on coarse textured gravelly soils, soils with less than 2% organic matter or in areas where the water table may be high.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Dry, heated storage above 0°C. Keep away from sources of heat above 40°C. Keep containers closed when not in use.

Rovral Flo/Rovral RX (iprodione)

Group 2

Manufacturer: Bayer CropScience Inc.

- 1. Formulations:** Flowable; 240 g/L (PCP# 24378); 2 x 8.4 L pack.
- 2. Registered Mixes:** None.
- 3. Crops:** Alfalfa grown for seed, canola, kidney beans, snap beans, white beans.
- 4. Diseases Controlled:** Alternaria, Botrytis pod rot, Sclerotinia stem rot, Sclerotinia white mold.
- 5. When Used:**

Alfalfa: For control of Sclerotinia. Apply when crop is in the 10 - 50% bloom stage.

Canola: For control of Sclerotinia stem rot: Apply when crop is in the 20 - 50% bloom stage. Best protection will be achieved when a fungicide is applied at the 20 - 30% bloom stage prior to petal drop.

For Argentine varieties, apply when 15 - 20% of the flowers are open (including small pods) on the main stem. For Polish varieties, apply when 11 - 15% of the flowers (or small pods) are open on the main stem.

Kidney and white beans: For control of Sclerotinia white mould: Treatment prior to the presence of disease is preferable; however, Rovral is still effective if applied at the initial sign of infection, when less than 5% of the plants are showing Sclerotinia white mold. Apply when beans are in the 25 - 75% bloom stage. **Snap beans:** For Sclerotinia white mold control: Apply when 50% of the bloom has opened. For Botrytis pod rot control: Apply twice, when 30% and again when 50% of the blooms have opened.

Rovral Flo/Rovral RX (cont'd)**6. How to Apply:**

With: Aircraft or ground equipment.

Water volume: Beans 18 L/ac (air); 121 L/ac (ground). Canola 18 L/ac (air); 40 L/ac (ground).

Rate:

Crop	Disease	Rovral Flo/Rovral RX mL/ac
Alfalfa – seed production****	Sclerotinia	850 - 1,255*
Canola – single application	Sclerotinia stem rot	840 - 1,253*
	Alternaria (suppression)	840
	Alternaria (control)***	840
Canola – split application**	Sclerotinia stem rot and Alternaria (suppression)	420 - 630 + 420
	Alternaria (control)***	420 + 420

* Higher rate for fields with a history of heavy disease pressure or with dense crop stands.

** Apply first application (420 - 630 mL/ac) at the 20% bloom stage of canola. The use of the higher rate on the first application is recommended for field with a history of sclerotinia disease pressure or dense crop stands. The second application should be made at the 50% bloom stage of canola for sclerotinia control.

*** Control of alternaria requires an application at the early green pod stage. Early green pod stage occurs when almost all the canola pods are fully formed and still green with only a few flowers or underdeveloped pods remaining at the top of the plant.

**** Ground application only.

7. Application Tips: When disease is actively growing in beans, the infection may quickly exceed the point where 5% of plants show mold. Spray mixture should be used on the day prepared. Good spray coverage is essential.

8. How it Works: Rovral is a protective and eradicator fungicide. Prevents disease infestation during the mid-flowering period and thus protects against major yield losses.

Effects of rainfall: Do not spray in heavy dew or when rain is imminent.

9. Grazing and Harvest Restrictions: Observe a pre-harvest interval of 38 days. Treated alfalfa vegetation is not to be used for animal feed.

10. Toxicity: Very low acute mammalian toxicity. Acute oral LD₅₀ (rats) iprodione = 3,500 mg/kg. Very low toxicity to bees.

11. Precautions, First Aid: Check label for first aid information.

12. Storage: Store above 0°C.

Scala (pyrimethanil)

Group 9

Manufacturer: Bayer CropScience Inc.

1. Formulations: Suspension concentrate; 240 g/L pyrimethanil (PCP# 28011); 2 L.

2. Registered Mixes: Bravo 500 (for potatoes only).

3. Crops: Potato.

4. Disease Controlled: Early blight.

Safety information, see page 25

5. When Used: Potato – apply when plants are 15 - 20 cm high or when environmental conditions are conducive to disease development. Repeat applications at 7 - 14 day intervals or as necessary to maintain disease control. If severe disease conditions exist, use the 7 day interval. Minimum spray interval is 7 days. Ensure that the area to be treated is covered uniformly.

6. How to Apply: With ground equipment. Thorough coverage of all plant parts to be protected is essential for good disease control. Use sufficient water volume and spray pressure to provide thorough and uniform coverage for optimum disease control.

Vegetable crops: Apply Scala SC fungicide in a minimum spray volume of 120 L/ac for ground application. The proper mixing procedure for Scala SC fungicide is as follows:

1. Fill the spray tank 1/2 full with clean water and start agitation.
2. Add the required amount of Scala SC fungicide.
3. Fill spray tank to desired level and maintain constant agitation to ensure uniformity of spray mixture.
4. When tank mixing with Bravo 500 for use on potatoes, follow use directions according to the Bravo 500 label.

Crop	Disease	Rate mL/ac	Timing
Potato	Early blight (<i>Alternaria solani</i>)	Scala SC fungicide applied in tank mixture with Bravo 500. Apply Scala SC fungicide at 300 mL/ac plus Bravo 500 according to Bravo 500 label directions. A maximum of six applications per year may be made.	Apply when plants are 15 - 20 cm high or when environmental conditions are conducive to disease development. Repeat applications at 7 - 14 day intervals or as necessary to maintain disease control. If severe disease conditions exist, use the 7 day interval. Minimum spray interval is 7 days. Ensure that the area to be treated is covered uniformly.

7. Application Tips: Thorough coverage of all plant parts to be protected is essential for good disease control. Use sufficient water volume and spray pressure to provide thorough and uniform coverage for optimum disease control.

Do not apply more than 2.4 L/ac of Scala SC fungicide in a single growing season.

Field sprayer application: **Do not** apply during periods of dead calm. Avoid application of this product when winds are gusty. **Do not** apply with spray droplets smaller than medium size.

Do not apply by air.

8. How it Works: Scala SC fungicide is a systemic fungicide that is effective on the above noted diseases. Scala SC fungicide is best suited for use in a preventative treatment program.

9. Grazing and Harvest Restrictions: Pre-harvest interval: Potatoes 7 days.

Cropping restrictions: Wheat may be planted 30 days following the application of Scala SC fungicide. For all other crops not listed on the Scala SC fungicide label, a plant-back interval of 130 days must be observed.

Buffer zones: The buffer zones specified in the table below are required between the point of direct application and the closest downwind edge of sensitive freshwater habitats (such as lakes, rivers, sloughs, ponds, prairie potholes, creeks, marshes, streams, reservoirs and wetlands) and estuarine/marine habitats.

Method of application	Buffer zone (metres) for protection of	
	Freshwater habitat	Estuarine/marine habitat
Field sprayer	1	0
Field sprayer with shrouds	0	0
Field sprayer with cones	0	0

Scala (cont'd)

- 10. Toxicity:** Acute oral LD_{50} (male/female rat) = >5,000 mg/kg.
Acute dermal LD_{50} (male/female rat) = >4,000 mg/kg.

This product is toxic to aquatic organisms. Observe buffer zones. To reduce runoff from treated area into aquatic habitats, consider the characteristics and conditions of the site before treatment. Site characteristics and conditions that may lead to runoff include, but are not limited to, heavy rainfall, moderate to steep slope, bare soil, poorly draining soil (e.g., soils that are compacted or fine textured such as clay). Avoid application of this product when heavy rain is forecast. Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip between the treated area and the edge of the water body.

Do not apply this product through any type of irrigation system.

- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Do not contaminate water, food or feed by storage or disposal. Do not use or store in or around the home. **Cannot be stored below freezing.** If stored for 1 year or longer, shake well before using. Store the tightly closed container away from feeds, seeds, fertilizer, plants and foodstuffs.
- 13. Resistance Management:** See page 41 for information on resistance management.

Senator 70WP *(thiophanate methyl)*

Group 1

Manufacturer: Engage Agro Corporation

- 1. Formulations:** Wettable powder; 70% (PCP# 25343); 2 kg.
- 2. Registered Mixes:** None.
- 3. Crops:** Sugarbeet, white beans.
- 4. Diseases Controlled:** Leaf spot, white mold.
- 5. When Used:** **Sugarbeets:** Apply when disease first appears. Repeat 14 - 21 days later if required.
White beans: Apply when conditions favouring development of disease exists, which usually occurs during early stages of bloom prior to rows closing in. Repeat applications if required.
- 6. How to Apply:**
With: Ground equipment for both sugarbeets and white beans or by air for white beans only.
Rate: **Sugarbeets:** 0.17 - 0.23 kg/ac. **White beans:** 0.71 - 0.91 kg/ac.
Water volume: **White beans:** Ground: 404 L/ac; Aerial: 20 - 24 L/ac.
- 7. Application Tips:** Reduced control can be expected in fields where volunteers from the previous year's crop act as a source of infection.
Consult your provincial specialist for recommendations.
- 8. How it Works:** Senator 70WP is a systemic fungicide effective against certain fungal diseases.
- 9. Grazing and Harvest Restrictions:** **Sugarbeet:** Do not apply within 21 days of harvest. No sugarbeets or parts of the sugarbeets are to be used as fodder or feed. **White beans:** Do not feed or allow livestock to graze on treated crops.
- 10. Toxicity:** Very low acute mammalian toxicity. Acute oral LD_{50} (rats) technical >6,000 mg/kg (practically non-toxic).
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Store in a dry place.
- 13. Resistance Management:** See page 41 for information on resistance management.

Safety information, see page 25

Serenade ASO *(Bacillus subtilis)*

Biofungicide

Manufacturer: AgraQuest, Inc. – Distributed through United Agri Products Canada Inc.

- 1. Formulations:** Aqueous suspension (PCP# 28626).
- 2. Registered Mixes:** None.
- 3. Crops*:** Bean, canola, chickpea, lentil, pea (all types), potato.
*See label for complete list of registered crops.
- 4. Diseases Controlled:** **Bean, chickpea, lentil, pea:** Sclerotinia stem rot, Botrytis blight.
Canola: Sclerotinia stem rot. **Potato:** Early blight.
- 5. When Used:** It may be applied as a foliar spray alone or in an alternating spray program with other registered crop protection products. For maximum effectiveness, apply Serenade ASO prior to or in the early stages of disease development. When conditions are conducive to heavy disease pressure, use Serenade ASO in a rotational program with other registered fungicides.
- 6. How to Apply:**

With: Ground equipment only.

Rate:

Crop	Disease	Product rate (L/ac)	Application instructions
Bean (<i>Lupinus</i> spp., <i>Phaseolus</i> spp., Vigna spp.), chickpea, lentil, pea (all types)	Botrytis blight Sclerotinia stem rot	1.6 – 6.0	Begin application soon after emergence and when conditions are conducive for disease development. Repeat on 7-10 day intervals.
Canola	Sclerotinia stem rot	0.4 – 1.6	Begin application at 20% to 30% bloom. A second application may be made 7-10 days later, at approximately 50% bloom and prior to significant petal fall, if conditions for disease development remain favourable. Use higher rates in fields with a history of heavy disease pressure.
Potato	Early blight	3.2 – 6.0	Begin application soon after emergence and when conditions are conducive for disease development. Repeat on 7-10 day intervals.

Water volume: Use appropriate application volume to give good canopy penetration and coverage of plant parts to be protected.

- 7. Application Tips:** See "Application Instructions" in table above. Under conditions of moderate to high disease pressures, use the higher rate and shorter application interval indicated.
- 8. How it Works:** Serenade ASO is a broad spectrum, preventative biofungicide used for the suppression of plant diseases.
- 9. Grazing and Harvest Restrictions:** Serenade ASO can be applied up to and including the day of harvest.
- 10. Toxicity:** Potential skin sensitizer.
- 11. Precautions, First Aid:** Check label for first aid information.
- 12. Storage:** Maximum storage period of nine months at room temperature.
- 13. Resistance Management:** See page 41 for information on resistance management.

Safety information, see page 25

Stratego 250 EC

(trifloxystrobin + propiconazole)

Group 11,3

Manufacturer: Bayer CropScience Inc.

1. **Formulations:** EC formulations; 125 g/L propiconazole and 125 g/L trifloxystrobin (PCP# 27528); 8 L jug.
2. **Registered Mixes: Wheat only:** Buctril M, Buctril M + Puma¹²⁰ Super, Refine Extra + Puma¹²⁰ Super.
Barley: Refine Extra + Puma¹²⁰ Super.
3. **Crops:** Barley, oats, wheat (Canadian prairie, durum, hard red, soft white, winter).
4. **Diseases Controlled: Barley:** Net blotch, scald, Septoria leaf blotch, spot blotch. **Oats:** Crown rust, Septoria leaf blotch. **Wheat:** Leaf and stem rust, powdery mildew, Septoria leaf blotch, stripe rust, tan spot.
5. **When Used:** Apply Stratego 250 EC at the very early stages of disease development. Typically, one application from the beginning of tillering up to flag leaf emergence is required. A second application may be made if needed up to 1/2 emergence of the head. Do not apply second application within 14 days of the first treatment.
Timing of application: Single application: 4 leaf to 1/2 head emergence. **Two applications:** First application – 4 leaf to flag leaf stage. Second application – up to 1/2 head emergence, but not within 14 days of first application. **Tank mix application:** With Buctril M – 4 leaf to early flag leaf stage. With Buctril M and Puma¹²⁰ Super or Refine Extra and Puma¹²⁰ Super – 4 leaf to the second tiller in barley or third tiller in wheat. Do not apply to crop stressed by severe weather conditions, frost, low fertility, drought, water saturated soil, disease or insect damage as crop injury may result. Do not apply Stratego 250 EC fungicide mixed with Puma¹²⁰ Super 2 - 3 days prior to or following cold temperatures (3°C) or lower as crop injury may occur.
6. **How to Apply:**
With: Aircraft or ground equipment.
Rate: 200 ml/ac.
Water volume:
Ground: 40 - 80 L/ac.
Aircraft: Minimum of 20 L/ac.
Pressure: Minimum of 275 kPa by ground.
7. **Application Tips:** Stratego 250 EC should be applied as a preventative disease control measure or at the very early stages of disease development. Established diseases are more difficult to control and may have already reduced crop vigor. Good coverage is essential for effective disease control. Any reduction in water volume can reduce disease control.
8. **How it Works:** Stratego 250 EC is a broad spectrum, foliar fungicide for disease control in cereals. Stratego contains two active ingredients providing both preventative and systemic activity resulting in sustained residual protection.
9. **Grazing and Harvest Restrictions:** Pre-harvest interval (days), grazing (30), grain, hay or straw (45). If 2 applications of Stratego 250EC are applied, do not allow grazing or harvesting of treated crop for forage or hay. Do not apply Stratego 250 EC within 45 days of harvest.
10. **Toxicity:** Oral LD₅₀ (rats) = 4,757 mg/kg.
11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** Store container in a cool, dry place away from food, drink and animal feedstuffs. Keep leftover product in original container, tightly closed, in a safe place. **Protect from freezing.**

Safety information, see page 25

Tanos 50 DF (famoxadone + cymoxanil)

Group 11,U

Manufacturer: E.I. duPont Canada Co.



Warning Poison

1. **Formulations:** Dry flowable; 25% famoxadone, 25% cymoxanil (PCP# 27435); 2.5 - 5 kg bag.
2. **Registered Mixes:** None.

Mixing instructions:

1. Fill the tank 1/4 to 1/3 full of water.
2. While agitating, add the required amount of Tanos 50 DF fungicide.
3. Continue agitation until the Tanos 50 DF fungicide is fully dispersed, at least 5 minutes.
4. Once the Tanos 50 DF fungicide is fully dispersed, maintain agitation and continue filling tank with water. Tanos 50 DF fungicide should be thoroughly mixed with water before adding any other material.
5. If the mixture is not continuously agitated, settling will occur. If settling occurs, thoroughly re-agitate before using.
6. Apply Tanos 50 DF Fungicide spray mixture within 12 hours of mixing to avoid product degradation.

3. **Crops:** Potatoes.

4. **Diseases Controlled:** Early blight, late blight.

5. **When Used:** Tanos 50 DF fungicide is a preventative fungicide for the control of early and late blight in potatoes. Make the first application of Tanos 50 DF fungicide following one or two applications of a preventative broad-spectrum fungicide, such as mancozeb or chlorothalonil. Applications may be made on a 7-day schedule, to a maximum of 6 applications per year.

6. **How to Apply:**

With: Ground equipment. Do not apply by air.

Rate: 227 - 340 grams/ac.

Water volume: Use 100 - 120 L/ac water volume with conventional sprayers. Use a minimum of 44 L/ac water volume with air assisted sprayers.

Pressure: 210 - 275 kPa.

Nozzles: Use hollow cone or flat fan nozzles. Do not use flood jet nozzles. Use 50 mesh screens or larger.

Sprayer cleanup: Immediately following application, thoroughly clean all spray equipment to reduce the risk of forming hardened deposits, which might become difficult to remove. Drain spray equipment. Thoroughly rinse sprayer and flush hoses, boom and nozzles with clean water. Clean all other associated application equipment. Take all necessary safety precautions when cleaning equipment. Do not clean near wells, water sources or desirable vegetation. Dispose of waste rinse water by applying it to a portion of the treated field.

7. **Application Tips:** Tanos 50 DF fungicide must not be applied to any crop suffering from stress as a result of drought, water logging, low temperatures, insect attacks, nutrient or lime deficiency or other factors reducing crop growth.

Not for use in home plantings nor once any commercial crop is turned into U-pick, Pick-Your-Own or similar operation.

Effects of rainfall: Tanos 50 DF fungicide is rainfast within 12 hours after application.

8. **How it Works:** Tanos 50 DF fungicide is both a protectant and locally systemic fungicide containing two different modes of action.

9. **Grazing and Harvest Restrictions:**

Do not harvest potatoes within 14 days of treatment.

Do not re-enter treated area within 24 hours.

Do not apply to more than 494 acres per day.

Safety information, see page 25

Tanos 50 DF (cont'd)

A buffer zone of 44 metres is required between the downwind point of direct application and the closest edge of sensitive aquatic habitats such as lakes, rivers, sloughs, ponds, coulees, prairie potholes, creeks, marshes, streams, reservoirs and wetlands. A buffer zone of 23 metres is required between the downwind point of direct application and the closest edge of estuarine/marine habitats. Do not contaminate these habitats when cleaning and rinsing spray equipment or containers.

Cropping restrictions: Crops that are on the Tanos 50 DF fungicide label may be planted back at any time; cereal grains may be planted back following a minimum plant back interval of 30 days, and all other crops may be planted back following a minimum plant back interval of one year.

10. **Toxicity:** Moderate acute mammalian toxicity. Famoxadone acute oral LD_{50} (rats) = >5,000 mg/kg. Cymoxanil acute oral LD_{50} (rats) = 960 mg/kg. Causes eye irritation. Harmful or fatal if swallowed.
11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** Store product closed in original container only. Protect against humid air and water. Not for use or storage in or around the home. Do not contaminate water, other pesticides, fertilizer, food or feed in storage. Keep container tightly closed.
13. **Resistance Management:** See page 41 for information on resistance management.

Tattoo C (propamocarbhydrochloride + chlorothalonil)

Group U,M

Manufacturer: Bayer CropScience Inc.



Danger Corrosive

1. **Formulations:** Suspension concentrate; 375 g/L propamocarb HCl + 375 g/L chlorothalonil (PCP# 24544); 10 L jug.
2. **Registered Mixes:** None.
3. **Crops:** Potatoes.
4. **Diseases Controlled:** Late blight.
5. **When Used:** Use a maximum of 3 applications of Tattoo C per growing season as a foliar spray in a preventative program for control of late blight in potatoes. Begin applications when conditions are favorable for disease, but before infection, and continue on 7 - 14 day intervals until the threat of disease is over. Use the 7-day interval when the risk and conditions for disease are high. When applying Tattoo C on the longer spray interval (10 - 14 days), alternate with an application of a contact fungicide midway between Tattoo C applications.
6. **How to Apply:**
 - With:** Ground equipment.
 - Rate:** 1.1 L/ac.
 - Water volume:** Apply in 80 - 120 L of water per acre. Ensure thorough coverage of the potato foliage.
 - Sprays:** Do not allow spray mixture to remain in tank overnight or for long periods during the day without agitation.
 - Mixing instructions:** Add one-half of the required amount of water to the spray or mixing tank and start agitation. Add the required quantity of Tattoo C to the water and complete filling with water. Maintain agitation throughout spraying.
7. **Application Tips:** Thorough spray coverage of all plant material (particularly lower stems) is essential to attain optimum systemic activity. If multiple fungicide applications are required, rotation with other fungicide products is recommended. Where possible, Tattoo C should be applied in alternation with a fungicide having a different mode of action. Treatments with any product containing chlorothalonil must be separated by a minimum of 7 days.

Safety information, see page 25

8. **How it Works:** Tattoo C is a fungicide that combines the systemic action of propamocarb hydrochloride with the contact activity of chlorothalonil to give protection against late blight of potatoes. Propamocarb hydrochloride only moves upward in the potato plant, so it is essential to ensure coverage of the lower portions of the plant.
9. **Grazing and Harvest Restrictions:** Do not apply within 7 days of harvest. Do not feed treated crops to livestock.
10. **Toxicity:** Low acute mammalian toxicity. Acute oral LD₅₀ (rats) propamocarb hydrochloride = 2,000 - 8,550 mg/kg; chlorothalonil = 4,200 mg/kg.
11. **Precautions, First Aid:** Check label for first aid information.
12. **Storage:** Cannot be stored below freezing. Keep away from fire or open flame or other sources of heat. If stored for 1 year or longer, shake well before using.

Tilt 250E/Bumper 418 EC/ Pivot 418 EC (propiconazole)

Group 3

Manufacturer: Syngenta Crop Protection/MANA Canada/Interprovincial Co-operatives



Caution Poison



Warning Poison

1. **Formulations:** **Tilt 250E:** Emulsifiable concentrate; 250 g/L (PCP# 19346); 2 x 5 L jugs, 4 x 5 L jugs.
Bumper 418 EC: Emulsifiable concentrate; 418 g/L (PCP# 28017); 2 x 4.8 L.
Pivot 418 EC: Emulsifiable concentrate; 418 g/L (PCP# 28219); 2 x 4.8 L.
2. **Registered Mixes*:** **Tilt 250E** - 2,4D Amine, MCPA Amine, Buctril M, Horizon 240EC, Axial, Pardner.
Bumper 418 EC - 2,4D Amine, MCPA Amine, Horizon 240EC, Badge, Bromotril 240 EC.
Pivot 418 EC - 2,4D Amine, MCPA Amine, Buctril M, Pardner, Horizon, Logic M, Badge, Bromotril 240 EC, Brotex 240
 * See label for registered crops and crop staging information.
3. **Crops:** **Tilt/Bumper/Pivot:** Barley, Canada prairie spring wheat, canary seed, canola, corn, dry beans, durum wheat, hard red spring wheat, oats, soft white spring wheat, soybean, timothy*, winter wheat.
 * Tilt and Bumper only.

4. Diseases Controlled:

Barley

leaf rust
net blotch
powdery mildew
scald
Septoria leaf spot
spot blotch
stem rust

* Tilt only.

Canola

blackleg

Oat

crown rust
Septoria leaf blotch

Soybeans

Asian rust*
cercospora leaf spot
powdery mildew*

Wheat

glume blotch
leaf rust
powdery mildew
Septoria leaf spot
stem rust
stripe rust
tan spot

Diseases suppressed: Septoria leaf mottle in canary seed.

Tilt 250E/Bumper 418 EC/Pivot 418 EC (cont'd)**5. When Used:**

Barley, oats and wheat: Apply at a very early stage of disease development, anytime from the beginning of stem elongation to before the head is half emerged. Best results have been achieved when Tilt/Bumper/Pivot is applied just as the flag leaf emerges. Conditions that favour a good crop are often the same conditions that favour leaf diseases. Dependant on disease pressure, 202 mL/ac can be applied at flag leaf timing for extended control.

Canola: Apply Tilt/Bumper/Pivot during the rosette stage (between 2nd true leaf and bolting). Tilt/Bumper/Pivot will control blackleg and enhance yield potential during the early stages of canola growth.

Canary seed: Apply at emergence to flag leaf stage (ground application only).

Soybeans: Make the first application at the first sign of disease. Apply the high rate only under conditions of high disease pressures. A second application at 14 days interval may be needed if conditions persist.

Note: Tilt/Bumper/Pivot should be applied as a preventative disease control measure. Established diseases are more difficult to control and may have already reduced crop vigour.

6. How to Apply:

With: Aircraft or ground equipment.

Rate: Tilt 250E: 202 mL/ac. Bumper 418 EC: 120 mL/ac. Pivot 418 EC: 120 mL/ac.

Tilt only: For very early season suppression of Net Blotch and tan spot in barley and wheat apply 101 mL/ac from as early as the 2 leaf stage to the 3 tillers stage when tank-mixed with Horizon and Axial at herbicide timing.

Tilt on soybeans for Asian rust: 202 - 306 mL/ac. For control of Asian rust apply lower rate under conditions of low disease pressure.

Water volume: Tilt 250E: 80 L/ac (ground); 16 - 20 L/ac (air). Bumper 418 EC: Minimum 80 L/ac. Pivot 418 EC: Minimum 80 L/ac (ground); 16 - 20 L/ac (air).

Pressure: Tilt 250E: 275 kPa. Bumper 418 EC and Pivot 418 EC: 200 - 300 kPa.

Nozzles: Tilt 250E: Flat fan (ground); flat fan or hollow cone (air). Bumper 418 EC: Medium spray. Pivot 418 EC: Flat fan (ground); flat fan or hollow cone (air).

7. Application Tips: Good coverage is essential for effective disease control. Any reduction in water volume can reduce disease control.

8. How it Works: Partially systemic, Tilt/Bumper/Pivot - propiconazole is transported upwards in plants. It has both preventative and curative activity. Length of control will vary from 3 - 4 weeks depending on disease, crop and environmental conditions. Strongly absorbed by most soils. Studies show that Tilt/Bumper/Pivot - propiconazole remains in the upper layers of the soil and very little to no leaching occurs.

Effects of rainfall: If rainfall occurs within 1 hour of application, re-application is necessary.

9. Grazing and Harvest Restrictions: Do not graze animals on treated green crops within 3 days of application. Last application must be made prior to 45 days before harvest in cereals and 60 days before harvest in canola. Straw from cereals can be fed to livestock provided no tank mix was used.

10. Toxicity: Tilt 250E: Low acute mammalian toxicity. Acute oral LD₅₀ (rats) technical = 1,517 mg/kg, Tilt = 2,105 mg/kg. Toxic to fish.

Bumper 418 EC: Low acute mammalian toxicity. Oral LD₅₀ (male rats) = >2,000 mg/kg. Toxic to aquatic organisms.

11. Precautions, First Aid: Check label for first aid information.

12. Storage: Heated storage only.

13. Resistance Management: See page 41 for information on resistance management.

For more detailed selector chart information, visit www.agriculture.alberta.ca/herbicide

Herbicide Selector Chart - Cereals

Crop	American Nightshade	Annual Smartweed/Lady's Thumb	Annual Sow-thistle			
Barley	Achieve Liquid Gold Approve Badge Benchmark Bromotril Brotex 240 Buctril M Koril Leader Logic M Mextrol Pardner Thrasher Thumper Titanium	Achieve Liquid Gold Accurate Ally Approve Assert FL Attain, XC Badge Banvel II Benchmark Broadband Bromotril Brotex 240 Buctril M Caliber 400 ¹ Cobutox 600 ¹ Crossfire	Curtail M Deploy Dichlorprop-D DyVel DyVel DSp 2,4-D 2,4-DB Embutox 625 ¹ Estoprop Plus Frontline Koril Leader Linuron 480 + MCPA Logic M Lorox + MCPA	MCPA ¹ (all forms) Mextrol Nimble Pardner Prestige, XC Refine SG Sencor Spectrum Sword Target Thumper Titanium Tracker XP Thrasher Trophy Turboprop Unity	Accurate ¹ Ally ¹ Assert FL ¹ Attain, XC ¹ Benchmark ¹ Broadband ¹ Clovitox Plus ¹ Crossfire ¹ Curtail M Dichlorprop-D DyVel DSp 2,4-D ¹ Estoprop Plus Frontline	Infinity MCPA ¹ (all forms) Prestige, XC Refine M ¹ Spectrum Sword Target Topside Tracker XP Triton C Tropotox Plus Tundra Turboprop
Wheat (C - CLEARFIELD wheat)	Achieve Liquid Gold Approve Badge Benchmark Bromotril Brotex 240 Buctril M Horizon BTM Koril Leader Logic M Mextrol Pardner Signal D Signal M Thrasher Thumper Titanium	Achieve Liquid Gold Adrenalin SC (C) Accurate Ally Approve Assert FL Attain, XC Badge Banvel II Basagran + 2,4-D Benchmark Broadband Bromotril Brotex 240 Buctril M Caliber 400 ¹ Cobutox 600 ¹ Crossfire ² Curtail M	Cypress Deploy Dichlorprop-D DyVel DyVel DSp 2,4-D 2,4-DB ¹ Embutox 625 Estoprop Plus Everest Frontline Frontline 2,4-D Harmony K ² Harmony SG Harmony Total Horizon BTM Koril Leader Linuron 480 + MCPA Logic M	Lorox + MCPA MCPA ¹ (all forms) Mextrol Nimble Pardner Prestige, XC Refine SG Sencor Signal D Signal M Simplicity Spectrum Sword Target Thrasher Thumper Titanium Tracker XP Trophy ² Turboprop Unity	Adrenalin SC (C) Accurate ¹ Ally ¹ Assert FL ¹ Attain, XC ¹ Benchmark ¹ Broadband ¹ Clovitox Plus ¹ Crossfire ^{1,2} Curtail M Cypress Dichlorprop-D DyVel DSp 2,4-D Estoprop Plus Frontline ¹	Frontline 2,4-D Infinity MCPA ¹ (all forms) Prestige, XC Refine M ¹ Spectrum Sword Target Topside Tracker XP Triton C Tropotox Plus Tundra Turboprop Velocity m3
Oats	Badge Bromotril Brotex 240 Buctril M Koril Logic M Mextrol Pardner	Badge Banvel II Bromotril Brotex 240 Buctril M Caliber 400 ¹ Cobutox 600 ¹ Curtail M Deploy	DyVel 2,4-DB ¹ Embutox 625 Frontline Koril Linuron 480 + MCPA Logic M Lorox + MCPA	MCPA ¹ (all forms) Mextrol Nimble Pardner Refine SG Spectrum Sword Target Tracker XP	Clovitox Plus ¹ Curtail M Frontline ¹ MCPA ¹ (all forms) Refine M ¹ Spectrum	Sword Target Topside Tracker XP Tropotox Plus
Fall Rye (spring application)	Achieve Liquid Gold Badge Bromotril Brotex 240 Buctril M Koril Logic M Mextrol Pardner	Achieve Liquid Gold Badge Bromotril	Brotex 240 Buctril M 2,4-D MCPA ¹ (all forms)	Koril Logic M Mextrol Pardner	Clovitox Plus ¹ 2,4-D ¹ MCPA ¹ (all forms)	Topside Tropotox Plus
Triticale	Bromotril Brotex 240 Koril Pardner	Bromotril Brotex 240	Koril	Pardner	Infinity	

¹ Suppression only

² All spring wheat except durum

³ All spring wheats (including durum when tank mixed with 2,4-D ester)

⁴ See page 41 for resistance information

⁵ Top growth control

⁶ Spring rosettes only

⁷ Registered on a limited number of varieties, refer to label

For more detailed selector chart information, visit www.agriculture.alberta.ca/herbicide

Herbicide Selector Chart – Cereals

Crop	Barnyard Grass	Bluebur	Canada Thistle
Barley	Achieve Liquid Gold Advance 10G Axial Bison Bonanza Broadband Cordon Hoe-Grass II Liquid Achieve SC Marengo Puma ^{1,2} Super Puma Advance Rival 10G Titanium Treflan QR5 Tundra Wildcat	Achieve Liquid Gold Accurate Ally Approve Attain, XC Badge Benchmark Bromotril Brotex 240 Buctril M Dichlorprop-D 2,4-D	Estaprop Plus Koril Leader Logic M MCPA ¹ (all forms) Mextrol Pardner Thrasher Thumper Titanium Turboprop
			Achieve Liquid Gold ¹ Accurate ¹ Ally ¹ Assert FL ¹ Attain, XC ¹ Badge ¹ Banvel II ¹ Buctril M ¹ Caliber 400 ¹ Clovitox Plus ¹ Cobutox 600 ¹ Comptox ¹ Curtail M Deploy ¹ Dichlorprop-D
			DyVel ¹ DyVel DSp ⁵ 2,4-DB ¹ Embutox 625 Estaprop Plus ¹ Express SG ¹ Express Pro ¹ Frontline ¹ Infinity ¹ Linuron 480 + MCPA ¹ Logic M ¹ Lontrel Lorox + MCPA ¹ MCPA ¹ (all forms) Mecoprop ¹
			Mextrol ¹ Nimble ¹ Nuance ¹ Prestige, XC Refine M ¹ Refine SG ¹ Spectrum Sword ¹ Target ¹ Titanium ¹ Topside ¹ Tracker XP ¹ Triton C ¹ Triton K ¹ Tropotox Plus ¹ Tundra ¹ Turboprop ¹
Wheat (C - CLEARFIELD wheat)	Achieve Liquid Gold Adrenalin SC (C) Altitude FX (C) Axial Bengal Bison Broadband Cordon Foothills Hoe-Grass II Horizon NG Horizon BMT Ladder Liquid Achieve SC Marengo Nextstep Puma ^{1,2} Super Puma Advance Signal Signal D Signal M Titanium Tundra Velocity m3 Wildcat	Achieve Liquid Gold Adrenalin SC (C) Accurate Ally Approve Attain, XC Badge Benchmark Bromotril Brotex 240 Buctril M Dichlorprop-D 2,4-D Estaprop Plus	Frontline 2,4-D Horizon BTM Koril Leader Logic M MCPA ¹ (all forms) Mextrol Pardner Signal D Signal M Thrasher Thumper Titanium Turboprop
			Achieve Liquid Gold ¹ Adrenalin SC ¹ (C) Accurate ¹ Ally ¹ Assert FL ¹ Attain, XC ¹ Badge ¹ Banvel II ¹ Basagran + 2,4-D ^{1,3} Buctril M ¹ Caliber 400 ¹ Clovitox Plus ¹ Cobutox 600 ¹ Comptox ¹ Curtail M Deploy ¹ Dichlorprop-D ¹ DyVel ¹
			DyVel DSp ⁵ 2,4-D ¹ 2,4-DB ¹ Embutox 625 Estaprop Plus ¹ Express SG ¹ Express Pro ¹ Frontline ¹ Frontline 2,4-D ¹ Harmony K ^{1,2} Harmony SG ¹ Harmony Total ¹ Horizon ¹ Horizon BTM ¹ Infinity ¹ Logic M ¹ Linuron 480 + MCPA ¹ Lontrel Lorox + MCPA ¹
			MCPA ¹ (all forms) Mecoprop ¹ Mextrol ¹ Nimble ¹ Nuance ¹ Prestige, XC Refine M ¹ Refine SG ¹ Signal M ¹ Spectrum Sword ¹ Target ¹ Titanium ¹ Topside ¹ Tracker XP ¹ Triton C ¹ Triton K ¹ Tropotox Plus ¹ Tundra ¹ Turboprop ¹ Velocity m3 ¹
Oats		Badge Bromotril Brotex 240 Buctril M Koril	Logic M MCPA ¹ (all forms) Mextrol Pardner
			Badge ¹ Banvel II ¹ Buctril M ¹ Caliber 400 ¹ Clovitox Plus ¹ Cobutox 600 ¹ Comptox ¹ Curtail M Deploy ¹ DyVel ¹
			2,4-DB ¹ mbutox 625 Frontline ¹ Linuron 480 + MCPA ¹ Logic M ¹ Lontrel Lorox + MCPA ¹ MCPA ¹ (all forms) Mecoprop ¹
			Mextrol ¹ Nimble ¹ Refine M ¹ Refine SG ¹ Spectrum Sword ¹ Target ¹ Topside ¹ Tracker XP ¹ Tropotox Plus ¹
Fall Rye (spring application)	Achieve Liquid Gold Liquid Achieve SC Bison Marengo	Achieve Liquid Gold Badge Bromotril Brotex 240 Buctril M	2,4-D Koril Logic M MCPA ¹ (all forms) Pardner
			Achieve Liquid Gold ¹ Badge ¹ Buctril M ¹
			Clovitox Plus ¹ Logic M ¹ MCPA ¹ (all forms)
Triticale		Bromotril Brotex 240	Koril Pardner
			Infinity ¹

¹ Suppression only² All spring wheat except durum³ All spring wheats (including durum when tank mixed with 2,4-D ester)⁴ See page 41 for resistance information⁵ Top growth control⁶ Spring rosettes only⁷ Registered on a limited number of varieties, refer to label

Herbicide Selector Chart - Cereals

Crop	Cleavers		Common Chickweed ⁴		Common Groundsel	
Barley	Assert FL Attain, XC Benchmark Broadband Compitox Deploy ¹ DyVel ¹ DyVel DSp ¹ Frontline Infinity Mecoprop Nimble ¹	Prestige, XC Pulsar Refine M ¹ Refine SG ¹ Spectrum Stellar Sword Target Tracker XP Triton C Trophy Tundra Unity	Accurate Ally Assert FL Attain, XC ¹ Benchmark Broadband Compitox Deploy Express Pro Frontline Infinity Linuron 480 + MCPA	Lorox + MCPA Mecoprop Nimble Prestige, XC ¹ Refine M Refine SG Sencor Spectrum Triton C Tundra Unity	Achieve Liquid Gold Accurate Ally Approve Badge Benchmark Bromotril Brotex 240 Buctril M Curtail M Deploy Hoe-Grass II Koril Leader	Logic M Lontrel Mextrol Nimble Pardner Prestige, XC Refine M Refine SG Sencor Thrasher Thumper Titanium Triton C
Wheat (C - CLEARFIELD wheat)	Adrenalin SC ¹ (C) Altitude FX (C) Assert FL Attain, XC Banvel II Basagran + 2,4-D Benchmark Broadband Compitox Cypress Deploy ¹ DyVel ¹ DyVel DSp ¹ Frontline Frontline 2,4-D Harmony K ^{1,2}	Harmony SG ¹ Harmony Total ¹ Infinity Mecoprop Nimble ¹ Prestige, XC Pulsar Refine M ¹ Refine SG ¹ Simplicity Spectrum Stellar Sword Target Tracker XP Triton C Trophy ² Tundra Unity Velocity m3	Adrenalin SC ¹ (C) Accurate Ally Altitude FX (C) Assert FL Attain, XC ¹ Basagran ² + 2,4-D Benchmark Broadband Compitox Cypress Deploy Express Pro Frontline Frontline 2,4-D Harmony K ² Harmony SG	Harmony Total Infinity Linuron 480 + MCPA Lorox + MCPA Mecoprop Nimble Prestige, XC ¹ Refine M Refine SG Sencor Simplicity Spectrum Triton C Tundra Unity Velocity m3	Achieve Liquid Gold Adrenalin SC ¹ (C) Accurate Ally Approve Badge Basagran ² + 2,4-D Benchmark Bromotril Brotex 240 Buctril M Curtail M Deploy Harmony K ² Harmony SG Harmony Total	Hoe-Grass II Horizon BTM Koril Leader Logic M Lontrel Mextrol Nimble Pardner Prestige, XC Refine M Refine SG Sencor Signal D Signal M Thrasher Thumper Titanium Triton C
Oats	Banvel II ³ Compitox Deploy ¹ DyVel ¹ Frontline Mecoprop	Nimble ¹ Refine M ¹ Refine SG ¹ Spectrum Sword Target Tracker XP	Compitox Deploy Frontline Linuron 480 + MCPA Lorox + MCPA	Mecoprop Nimble Refine M Refine SG Spectrum	Badge Bromotril Brotex 240 Buctril M Curtail M Deploy Koril	Logic M Lontrel Mextrol Nimble Pardner Refine M Refine SG
Fall Rye (spring application)					Achieve Liquid Gold Badge Bromotril Brotex 240	Buctril M Logic M Mextrol Pardner
Triticale	Infinity		Infinity		Bromotril Brotex 240 Hoe-Grass II	Koril Pardner

¹ Suppression only

² All spring wheat except durum

³ All spring wheats (including durum when tank mixed with 2,4-D ester)

⁴ See page 41 for resistance information

⁵ Top growth control

⁶ Spring rosettes only

⁷ Registered on a limited number of varieties, refer to label

For more detailed selector chart information, visit www.agriculture.alberta.ca/herbicide

Herbicide Selector Chart – Cereals

Crop	Corn Spurry	Cow Cockle		Creeping Buttercup	Dandelion	Field Bindweed
Barley	Accurate	Achieve Liquid Gold	Logic M	Clovitox Plus ¹	Attain, XC	Attain, XC
	Ally	Accurate	Linuron 480 + MCPA	Topside ²	Cobutox 600 ¹	Banvel II
	Banvel II	Advance 10G		Tropotox Plus ⁵	Caliber 400 ¹	Caliber 400 ¹
	Compitox	Ally	Lorox + MCPA		Curtail M	Cobutox 600 ¹
	Deploy	Approve			2,4-D ¹	Clovitox Plus ¹
	DyVel	Badge	Mextrol		2,4-DB ¹	DyVel DSp
	DyVel DSp	Banvel II	Nimble		Embutox 625	2,4-DB ¹
	Linuron 480 + MCPA	Benchmark	Nuance		Infinity ¹	Embutox 625
	Lorox + MCPA	Bromotril	Pardner		MCPA amine ¹	MCPA ¹ (all forms)
	Mecoprop	Brotex 240	Refine M		MCPA ester ¹	Sword ⁵
	Nimble	Bonanza	Refine SG		MCPA K-salt	Target ⁵
	Refine M	Buctril M	Rival 10G		Prestige, XC	Topside ¹
	Refine SG	Deploy	Sword		Refine M	Tracker XP ⁵
	Sencor	DyVel	Target		Spectrum ¹	Tropotox Plus ¹
	Sword	DyVel DSp	Thrasher		Tundra ¹	
	Target	Thumper				
	Tracker XP	Express Pro	Titanium			
Triton C	Express SG	Tracker XP				
	Hoe-Grass II	Triton C				
	Koril	Triton K				
	Leader	Unity				
Wheat (C - CLEARFIELD wheat)	Accurate	Achieve Liquid Gold	Horizon BTM	Clovitox Plus ¹	Adrenalin SC ¹ (C)	Adrenalin SC ¹ (C)
	Ally	Accurate	Koril	Topside ²	Attain, XC	Attain, XC
	Banvel II	Adrenalin SC (C)	Leader	Tropotox Plus ⁵	Caliber 400 ¹	Banvel II
	Basagran ² + 2,4-D	Ally	Logic M		Cobutox 600 ¹	Basagran + 2,4-D ^{1,2}
	Compitox	Altitude FX (C)	Linuron 480 + MCPA		Curtail M	Caliber 400 ¹
	Cypress	Approve	Lorox + MCPA		Dichlorprop-D	Clovitox Plus ¹
	Deploy	Badge			2,4-D ¹	Cobutox 600 ¹
	DyVel	Banvel II	Mextrol		2,4-DB ¹	DyVel DSp
	DyVel DSp	Benchmark	Nimble		Embutox 625	2,4-DB ¹
	Harmony K ²	Bromotril	Pardner		Etaprop Plus	Embutox 625
	Harmony SG	Brotex 240	Refine M		Frontline 2,4-D	MCPA ¹ (all forms)
	Harmony Total	Buctril M	Refine SG		Harmony K	Sword ⁵
	Linuron 480 + MCPA	Cypress	Signal M		Infinity ¹	Target ⁵
	Lorox + MCPA	Deploy	Sword		MCPA Amine ¹	Topside ¹
	Mecoprop	DyVel	Target		MCPA Ester ¹	Tracker XP ⁵
	Nimble	DyVel DSp	Thrasher		MCPA K-salt	Tropotox Plus ¹
	Refine M	Express SG	Thumper		Prestige, XC	
Refine SG	Express Pro	Titanium		Refine M		
Sencor	Express SG	Tracker XP		Spectrum ¹		
Sword	Harmony K ²	Triton C		Tundra ¹		
Target	Harmony SG	Triton K		Velocity m3 ¹		
Tracker XP	Harmony Total	Unity				
Triton C	Hoe-Grass II					
Oats	Banvel II	Badge	Logic M	Clovitox Plus ¹	Caliber 400 ¹	Caliber 400 ¹
	Compitox	Banvel II	Mextrol	Topside ²	Cobutox 600 ¹	Clovitox Plus ¹
	Deploy	Bromotril	Pardner	Tropotox Plus ⁵	Curtail M	Cobutox 600 ¹
	DyVel	Brotex 240	Refine M		2,4-DB ¹	2,4-DB ¹
	Linuron 480 + MCPA	Buctril M	Refine SG		Embutox 625	Embutox 625
	Lorox + MCPA	DyVel	Sword		MCPA Amine ¹	MCPA ¹ (all forms)
	Mecoprop	Koril	Target		MCPA Ester ¹	Sword ⁵
	Nimble	Linuron 480 + MCPA	Tracker XP		MCPA K-salt	Target ⁵
	Refine M	Lorox + MCPA			Refine M	Tracker XP ⁵
	Refine SG				Spectrum ¹	Topside ¹
	Reglone					Tropotox Plus ¹
	Sword					
Target						
Tracker XP						
Fall Rye (spring application)		Achieve Liquid Gold	Buctril M	Clovitox Plus ¹	2,4-D ¹	Clovitox Plus ¹
		Badge	Logic M	Topside ²	MCPA Amine ¹	MCPA ¹ (all forms)
		Bromotril	Mextrol	Tropotox Plus ⁵	MCPA Ester ¹	Topside ¹
		Brotex 240	Pardner		MCPA K-salt	Tropotox Plus ¹
Triticale		Bromotril	Koril		Infinity ¹	
		Brotex 240	Pardner			
		Hoe-Grass II				

¹ Suppression only² All spring wheat except durum³ All spring wheats (including durum when tank mixed with 2,4-D ester)⁴ See page 41 for resistance information⁵ Top growth control⁶ Spring rosettes only⁷ Registered on a limited number of varieties, refer to label

Herbicide Selector Chart – Cereals

Crop	Field Horsetail	Flixweed			Green Foxtail ⁴	
Barley	Attain ⁵ Caliber 400 ¹ Clovitox Plus ¹ Cobutox 600 ¹ 2,4-D ¹ 2,4-DB ¹ Embutox 625 MCPA ¹ (all forms) Topside ⁵ Tropotox Plus ⁵	Achieve Liquid Gold Accurate Ally Approve Assert FL Attain, XC Badge Banvel II + 2,4-D Banvel II + MCPA Buctril M Curtail M Dichlorprop-D Deploy	DyVel DyVel DSp 2,4-D Estoprop Plus Express SG Express Pro Frontline Infinity Leader Linuron 480 + MCPA Logic M Lorox + MCPA MCPA (all forms) Mextrol Nimble Nuance	Prestige, XC Spectrum Refine M ¹ Refine SG Stellar Sword Target Thrasher Thumper Titanium Tracker XP Triton C Triton K Trophy Tundra Turboprop Unity	Achieve Liquid Gold Advance 10G Axial Bison Bonanza Broadband Cordon Express SG Express Pro Fortress Hoe-Grass II	Liquid Achieve SC Marengo Lorox ¹ Puma ^{1/20} Super Puma Advance Rival 500 Titanium Treflan EC Triton C ¹ Tundra Wildcat
Wheat (C - CLEARFIELD wheat)	Adrenalin SC ¹ (C) Attain ⁵ Caliber 400 ¹ Clovitox Plus Cobutox 600 ¹ 2,4-DB ¹ Embutox 625 ¹ MCPA ¹ (all forms) Topside ⁵ Tropotox Plus ⁵	Achieve Liquid Gold Adrenalin SC (C) Accurate Ally Altitude FX (C) Assert FL Attain, XC Approve Badge Banvel II + 2,4-D Banvel II + MCPA Buctril M Curtail M Deploy Dichlorprop-D DyVel DyVel DSp 2,4-D	Estoprop Plus Express SG Express Pro Frontline Frontline 2,4-D Harmony K ² Harmony SG Harmony Total Horizon BTM Infinity Leader Linuron 480 + MCPA Logic M Lorox + MCPA MCPA (all forms) Mextrol Nimble Nuance	Prestige, XC Refine M ¹ Refine SG Signal D Signal M Spectrum Stellar Sword Target Thrasher Thumper Titanium Tracker XP Triton C Triton K Trophy ² Tundra Turboprop Unity Velocity m3	Achieve Liquid Gold Adrenalin SC (C) Advance 10G Altitude FX (C) Axial Bengal Bison Bonanza Broadband Cordon Cypress Everest Express SG Express Pro Fortress Harmony K ² Harmony SG Foothills Harmony Total Hoe-Grass II	Horizon NG Horizon BTM Ladder Liquid Achieve SC Lorox ¹ Marengo Nextstep Puma ^{1/20} Super Puma Advance Rival 500 Signal Signal D Signal M Simplicity ¹ Titanium Treflan EC Triton C ¹ Velocity m3 Tundra Wildcat
Oats	Caliber ¹ Clovitox Plus ¹ Cobutox 600 ¹ 2,4-DB ¹ Embutox 625 MCPA ¹ (all forms) Topside ⁵ Tropotox Plus ⁵	Badge Banvel II + 2,4-D Banvel II + MCPA Buctril M Curtail M Deploy	DyVel Frontline Linuron 480 + MCPA Logic M Lorox + MCPA MCPA (all forms)	Mextrol Nimble Refine M ¹ Refine SG Spectrum Sword Target Tracker XP	Linuron 480 + MCPA ¹	Lorox ¹ Lorox + MCPA ¹
Fall Rye (spring application)	Clovitox Plus ¹ MCPA ¹ (all forms) Topside ⁵ Tropotox Plus ⁵	Achieve Liquid Gold Badge	Buctril M 2,4-D Logic M	MCPA (all forms) Mextrol	Achieve Liquid Gold Liquid Achieve SC	Bison Marengo
Triticale		Infinity			Hoe-Grass II Liquid Achieve SC	Bison Marengo

¹ Suppression only

² All spring wheat except durum

³ All spring wheats (including durum when tank mixed with 2,4-D ester)

⁴ See page 41 for resistance information

⁵ Top growth control

⁶ Spring rosettes only

⁷ Registered on a limited number of varieties, refer to label

For more detailed selector chart information, visit www.agriculture.alberta.ca/herbicide

Herbicide Selector Chart – Cereals

Crop	Hemp-nettle		Knotweed	Kochia ⁴		
Barley	Accurate Ally Assert FL Attain, XC ¹ Banvel II + MCPA K-salt Benchmark ¹ Broadband ¹ Clovitox Plus ¹ Deploy DyVel Frontline Infinity Linuron 480 + MCPA Lorox + MCPA	MCPA ¹ (all forms) Nimble Prestige, XC ¹ Refine M Refine SG Sencor Spectrum Stellar Sword Target Topside Triton C Tracker XP Trophy Tropotox Plus Tundra Unity	Advance 10G Bonanza DyVel DSp Rival 10G Sword Target Tracker XP Treflan QR5	Achieve Liquid Gold Accurate Ally Approve Assert FL Attain, XC Badge Banvel II + 2,4-D Banvel II + MCPA Benchmark Bromotril Brotex 240 Buctril M Curtail M ¹ Deploy Dichlorprop-D DyVel	DyVel DSp 2,4-D Estaprop Plus Express SG Express Pro Fortress Frontline Hoe-Grass II Infinity Koril Leader Logic M MCPA amine MCPA ester MCPA K-salt Mextrol Nimble Nuance	Pardner Prestige, XC Pulsar Refine M Refine SG Stellar Sword Target Thrasher Thumper Titanium Triton C Triton K Tracker XP Trophy Tundra Turboprop Unity
Wheat (C - CLEARFIELD wheat)	Adrenalin SC ¹ (C) Accurate Ally Altitude FX (C) Assert FL Attain, XC ¹ Banvel II + MCPA K-salt Benchmark ¹ Broadband ¹ Clovitox Plus ¹ Cypress Deploy DyVel Frontline Frontline 2,4-D ¹ Harmony K ² Harmony SG Harmony Total Infinity	Linuron 480 + MCPA Lorox + MCPA MCPA ¹ (all forms) Nimble Prestige, XC ¹ Refine M Refine SG Sencor Simplicity Spectrum Stellar Sword Target Topside Triton C Tracker XP Trophy ² Tropotox Plus Tundra Unity Velocity m3	Adrenalin SC ¹ (C) DyVel DSp Sword Target Tracker XP	Achieve Liquid Gold Accurate Adrenalin SC (C) Ally Altitude FX (C) Approve Assert FL Attain, XC Badge Banvel II + 2,4-D Banvel II + MCPA Benchmark Bromotril Brotex 240 Buctril M Curtail M ¹ Cypress Deploy Dichlorprop-D DyVel	DyVel DSp 2,4-D Estaprop Plus Express SG Express Pro Frontline Frontline 2,4-D Harmony K ² Harmony SG Harmony Total Hoe-Grass II Horizon BTM Infinity Koril Leader Logic M MCPA amine MCPA ester MCPA K-salt Mextrol Nimble	Nuance Pardner Prestige, XC Pulsar Refine M Refine SG Signal D Signal M Stellar Sword Target Thrasher Thumper Titanium Triton C Triton K Tracker XP Trophy ² Tundra Turboprop Unity Velocity m3
Oats	Banvel II + MCPA K-salt Clovitox Plus ¹ Deploy DyVel Frontline Linuron 480 + MCPA ¹ Lorox + MCPA ¹	MCPA ¹ (all forms) Nimble Refine M Refine SG Spectrum Sword Target Topside Tracker XP Tropotox Plus	Sword Target Tracker XP	Badge Banvel II + 2,4-D Banvel II + MCPA Bromotril Brotex 240 Buctril M	Curtail M ¹ Deploy DyVel Frontline Koril Logic M MCPA amine MCPA ester	MCPA K-salt Mextrol Nimble Pardner Refine M Refine SG Sword Target Tracker XP
Fall Rye (spring application)	Clovitox Plus ¹ MCPA ¹ (all forms)	Topside Tropotox Plus		Achieve Liquid Gold Badge Bromotril Brotex 240	Buctril M 2,4-D Logic M MCPA amine	MCPA ester MCPA K-salt Mextrol Pardner
Triticale	Infinity			Bromotril Brotex 240	Infinity Koril	Pardner

¹ Suppression only² All spring wheat except durum³ All spring wheats (including durum when tank mixed with 2,4-D ester)⁴ See page 41 for resistance information⁵ Top growth control⁶ Spring rosettes only⁷ Registered on a limited number of varieties, refer to label

Herbicide Selector Chart - Cereals

Crop	Lady's Thumb/Annual Smartweed			Lamb's-quarters		
Barley	Achieve Liquid Gold Accurate Ally Approve Assert FL Attain, XC Badge Banvel II Benchmark Broadband Bromotril Brotex 240 Buctril M Caliber 400 ¹ Cobutox 600 ¹ Deploy Dichlorprop-D	DyVel DyVel DSp 2,4-D 2,4-DB ¹ Embutox 625 ¹ Estoprop Plus Express SG Express Pro Koril Leader Linuron 480 + MCPA Logic M Lorox + MCPA MCPA ¹ (all forms) Mextrol Nimble	Pardner Prestige, XC Refine M Refine SG Sencor Stellar Sword Target Thrasher Thumper Titanium Tracker XP Triton C Tundra Turboprop Unity	Achieve Liquid Gold Accurate ¹ Advance 10G Ally ¹ Approve Assert FL Attain, XC Badge Benchmark Bonanza Bromotril Brotex 240 Buctril M Caliber 400 Clovitox Plus Cobutox 600 Curtail M Deploy Dichlorprop-D DyVel DyVel DSp	2,4-D 2,4-DB Embutox 625 Estoprop Plus Express SG Express Pro Frontline Fortress ¹ Hoe-Grass II Infinity Koril Leader Linuron 480 + MCPA Logic M Lorox + MCPA MCPA (all forms) Mecoprop Mextrol Nimble Nuance Pardner	Prestige, XC Pulsar Refine M Refine SG Rival 10G Sencor Spectrum Stellar Sword Target Thrasher Thumper Titanium Topside Tracker XP Tropotox Plus Triton C Triton K Trophy Tundra Turboprop Unity
Wheat (C - CLEARFIELD wheat)	Achieve Liquid Gold Accurate Adrenalin SC (C) Ally Approve Assert FL Attain, XC Badge Banvel II Basagran ² + 2,4-D Benchmark Broadband Bromotril Brotex 240 Buctril M Caliber 400 ¹ Cobutox 600 ¹ Crossfire ² Curtail M Cypress Deploy Dichlorprop-D	DyVel DyVel DSp 2,4-D 2,4-DB ¹ Embutox 625 Estoprop Plus Express SG Express Pro Frontline Frontline 2,4-D Harmony K ² Harmony SG Harmony Total Horizon BTM Koril Leader Linuron 480 + MCPA Logic M Lorox + MCPA MCPA ¹ (all forms) Mextrol Nimble	Pardner Prestige, XC Refine M Refine SG Sencor Signal D Signal M Simplicity Spectrum Stellar Sword Target Thrasher Thumper Titanium Tracker XP Triton C Trophy ² Tundra Turboprop Unity	Achieve Liquid Gold Accurate ¹ Adrenalin SC (C) Ally ¹ Altitude FX (C) Approve Assert FL Attain, XC Badge Banvel II Basagran ² + 2,4-D Benchmark Bromotril Brotex 240 Buctril M Caliber 400 Clovitox Plus Cobutox 600 Curtail M Cypress Deploy Dichlorprop-D DyVel DyVel DSp 2,4-D	2,4-DB Fortress ¹ Frontline Frontline 2,4-D Embutox 625 Estoprop Plus Express SG Express Pro Harmony K ² Harmony SG Harmony Total Hoe-Grass II Horizon BTM Infinity Koril Leader Linuron 480 + MCPA Logic M Lorox + MCPA MCPA (all forms) Mecoprop Mextrol Nimble Nuance	Pardner Prestige, XC Pulsar ¹ Refine M Refine SG Sencor Signal D Signal M Spectrum Stellar Sword Target Thrasher Thumper Titanium Topside Tracker XP Triton C Triton K Trophy ² Tropotox Plus Tundra Turboprop Unity Velocity m3
Oats	Badge Banvel II Bromotril Brotex 240 Buctril M Caliber 400 ¹ Cobutox 600 ¹ Curtail M Deploy	DyVel Embutox 625 Frontline Koril Linuron 480 + MCPA Logic M Lorox + MCPA MCPA ¹ (all forms)	Mextrol Nimble Pardner Refine M Refine SG Spectrum Sword Target Tracker XP	Badge Bromotril Brotex 240 Buctril M Caliber 400 Clovitox Plus Cobutox 600 Curtail M Deploy DyVel	2,4-DB Embutox 625 Frontline Koril Linuron 480 + MCPA Logic M Lorox + MCPA MCPA (all forms) Mextrol	Nimble Pardner Refine M Refine SG Spectrum Sword Target Topside Tracker XP Tropotox Plus
Fall Rye (spring application)	Achieve Liquid Gold Badge Bromotril Brotex 240	Buctril M 2,4-D Koril Logic M	MCPA ¹ (all forms) Mextrol Pardner	Achieve Liquid Gold Badge Bromotril Brotex 240	Buctril M Clovitox Plus 2,4-D Koril Logic M	MCPA (all forms) Mextrol Pardner Topside Tropotox Plus
Triticale	Bromotril Brotex 240	Koril	Pardner	Bromotril Brotex 240	Hoe-Grass II Infinity	Koril Pardner

¹ Suppression only

² All spring wheat except durum

³ All spring wheats (including durum when tank mixed with 2,4-D ester)

⁴ See page 41 for resistance information

⁵ Top growth control

⁶ Spring rosettes only

⁷ Registered on a limited number of varieties, refer to label

For more detailed selector chart information, visit www.agriculture.alberta.ca/herbicide

Herbicide Selector Chart – Cereals

Crop	Leafy Spurge	Narrow-leaved Hawk's-beard	Night-flowering Catchfly	Perennial Sow-thistle		
Barley	Attain, XC 2,4-D MCPA ¹ (all forms)	Ally + 2,4-D Caliber 400 Cobutox 600 Deploy 2,4-D 2,4-DB Embutox 625 Express SG Express Pro Nimble Nuance Refine M Refine SG Triton C Triton K	Achieve Liquid Gold Approve Badger Buctril M Dichlorprop-D Estoprop Plus Hoe-Grass II Leader Logic M Mextrol Sencor Sword Target Thrasher Thumper Titanium Tracker XP Turboprop	Achieve Liquid Gold ¹ Accurate ¹ Ally ¹ Assert FL ¹ Attain, XC ¹ Badger ¹ Banvel IP ¹ Benchmark ¹ Broadband ¹ Buctril M ¹ Caliber 400 ¹ Clovitox Plus ¹ Cobutox 600 ¹	Curtail M ¹ Deploy ¹ Dichlorprop-D ¹ DyVel ¹ 2,4-D ¹ 2,4-DB ¹ Embutox 625 Estoprop Plus ¹ Frontline ¹ Infinity ¹ Logic M ¹ Lontrel ¹ MCPA ¹ (all forms) Mextrol ¹	Nimble Prestige, XC ¹ Refine M ¹ Refine SG ¹ Spectrum ¹ Sword ¹ Target ¹ Titanium ¹ Topside ¹ Tracker XP ¹ Triton C ¹ Tropotox Plus ¹ Tundra ¹ Turboprop ¹
Wheat (C - CLEARFIELD wheat)	Adrenalin SC ¹ (C) Attain, XC 2,4-D MCPA ¹ (all forms)	Ally Caliber 400 Cobutox 600 Deploy 2,4-D ¹ 2,4-DB Embutox 625 Express SG Express Pro Harmony K ² Harmony SG Harmony Total Nimble Nuance Refine M Refine SG Triton C Triton K	Achieve Liquid Gold Adrenalin SC (C) Approve Badger Buctril M Cypress Dichlorprop-D Estoprop Plus Hoe-Grass II Leader Logic M Mextrol Sencor Signal D Signal M Sword Target Thrasher Thumper Titanium Tracker XP Turboprop	Achieve Liquid Gold ¹ Accurate ¹ Adrenalin SC ¹ (C) Ally ¹ Assert FL ¹ Attain, XC ¹ Badger ¹ Banvel IP ¹ Benchmark ¹ Broadband ¹ Buctril M ¹ Caliber 400 ¹ Clovitox Plus ¹ Cobutox 600 ¹ Curtail M ¹	Deploy ¹ Dichlorprop-D ¹ DyVel ¹ 2,4-DB ¹ Embutox 625 Estoprop Plus ¹ Frontline ¹ Frontline 2,4-D ¹ Harmony K ^{1,2} Harmony SG ¹ Harmony Total ¹ Horizon BTM ¹ Infinity ¹ Logic M ¹ Lontrel ¹ MCPA ¹ (all forms)	Mextrol ¹ Nimble Prestige, XC Refine M ¹ Refine SG ¹ Signal M ¹ Spectrum ¹ Sword ¹ Target ¹ Titanium ¹ Topside ¹ Tracker XP ¹ Triton C ¹ Tropotox Plus ¹ Tundra ¹ Turboprop ¹ Velocity m3 ¹
Oats	MCPA ¹ (all forms)	Caliber 400 Cobutox 600 Deploy 2,4-DB Embutox 625 Nimble Refine M Refine SG	Badger Buctril M Logic M Mextrol Sword Target Tracker XP	Badger ¹ Banvel IP ¹ Buctril M ¹ Caliber 400 ¹ Clovitox Plus ¹ Cobutox 600 ¹ Curtail M ¹ Deploy ¹ DyVel ¹	2,4-DB ¹ Embutox 625 Frontline ¹ Logic M ¹ Lontrel ¹ MCPA ¹ (all forms) Mextrol ¹ Nimble ¹	Refine M ¹ Refine SG ¹ Spectrum ¹ Sword ¹ Target ¹ Topside ¹ Tracker XP ¹ Tropotox Plus ¹
Fall Rye (spring application)	2,4-D MCPA ¹ (all forms)	2,4-D ¹	Achieve Liquid Gold Badger Buctril M Logic M Mextrol	Achieve Liquid Gold ¹ Badger ¹ Buctril M ¹	Clovitox Plus ¹ Logic M ¹ MCPA ¹ (all forms)	Mextrol ¹ Topside ¹ Tropotox Plus ¹
Triticale			Hoe-Grass II	Infinity ¹		

¹ Suppression only² All spring wheat except durum³ All spring wheats (including durum when tank mixed with 2,4-D ester)⁴ See page 41 for resistance information⁵ Top growth control⁶ Spring rosettes only⁷ Registered on a limited number of varieties, refer to label

Herbicide Selector Chart – Cereals

Crop	Persian Darnel	Prostrate Pigweed	Quack Grass	Ragweed		
Barley	Achieve Liquid Gold Advance 10G Bison Bonanza Express Pro Hoe-Grass II Liquid Achieve SC Marengo Rival 10G Titanium Treflan QR5	Accurate Ally DyVel DyVel DSp 2,4-D MCPA K-salt Sword Target Tracker XP	Glyphosate* (pre-harvest)	Achieve Liquid Gold Approve Assert FL Attain, XC Badge Benchmark Bromotril Brotex 240 Buctril M Caliber 400 Clovitox Plus Cobutox 600 Dichlorprop-D DyVel	DyVel DSp 2,4-D 2,4-DB Embutox 625 Estoprop Plus Frontline Infinity Koril Leader Linuron 480 + MCPA Logic M Lorox + MCPA MCPA (all forms) Mextrol	Pardner Refine SG + MCPA Stellar Sword Target Thrasher Thumper Titanium Topside Tracker XP Trophy Tropotox Plus Turboprop
Wheat (C - CLEARFIELD wheat)	Achieve Liquid Gold Adrenalin SC (C) Altitude FX (C) Bison Express Pro Foothills Hoe-Grass II Horizon NG Horizon BTM Ladder Liquid Achieve SC Marengo Nextstep Signal Signal D Titanium Velocity m3 ¹	Adrenalin SC ¹ (C) Accurate Ally Cypress DyVel DyVel DSp 2,4-D MCPA K-salt Sword Target Tracker XP	Glyphosate* (pre-harvest)	Achieve Liquid Gold Adrenalin SC (C) Approve Assert FL Attain, XC Badge Basagran ¹ Benchmark Bromotril Brotex 240 Buctril M Caliber 400 Clovitox Plus Cobutox 600 Cypress Dichlorprop-D	DyVel DyVel DSp 2,4-D 2,4-DB Embutox 625 Estoprop Plus Frontline Frontline 2,4-D Horizon BTM Infinity Koril Leader Linuron 480 + MCPA Logic M Lorox + MCPA MCPA (all forms)	Mextrol Pardner Refine SG + MCPA Signal D Signal M Stellar Sword Target Thrasher Thumper Titanium Topside Tracker XP Trophy ¹ Tropotox Plus Turboprop
Oats		DyVel MCPA K-salt Sword Target Tracker XP	Glyphosate* (pre-harvest)	Badge Bromotril Brotex 240 Buctril M Caliber 400 Clovitox Plus Cobutox 600 DyVel 2,4-DB	Frontline Embutox 625 Koril Linuron 480 + MCPA Logic M Lorox + MCPA MCPA (all forms) Mextrol	Pardner Refine SG + MCPA Sword Target Topside Tracker XP Tropotox Plus
Fall Rye (spring application)	Achieve Liquid Gold Bison Liquid Achieve SC Marengo	2,4-D MCPA K-salt		Achieve Liquid Gold Badge Bromotril Brotex 240	Buctril M Clovitox Plus 2,4-D Koril Logic M	MCPA (all forms) Mextrol Pardner Topside Tropotox Plus
Triticale	Bison Hoe-Grass II Liquid Achieve SC Marengo			Bromotril Brotex 240	Infinity Koril	Pardner

¹ Suppression only

² All spring wheat except durum

³ All spring wheats (including durum when tank mixed with 2,4-D ester)

⁴ See page 41 for resistance information

⁵ Top growth control

⁶ Spring rosettes only

⁷ Registered on a limited number of varieties, refer to label

For more detailed selector chart information, visit www.agriculture.alberta.ca/herbicide

Herbicide Selector Chart – Cereals

Crop	Redroot Pigweed			Round-leaved Mallow	Russian Pigweed
Barley	Achieve Liquid Gold Accurate Ally Approve Assert FL Attain, XC Badge Banvel II Benchmark Broadband ¹ Brotex 240 Buctril M Caliber 400 Clovite Plus Cobutox 600 Curtail M Deploy DyVel DyVel DSp 2,4-D	2,4-DB Embutox 625 Etaprop Plus Express SG Express Pro Fortress ¹ Frontline Infinity Leader Linuron 480 + MCPA Logic M Lorox + MCPA MCPA ¹ (all forms) Mextrol Nimble Nuance Pardner Prestige, XC Pulsar ¹	Refine M Refine SG Sencor Spectrum Stellar Sword Target Thrasher Thumper Titanium Topside Tracker XP Triton C Triton K Trophy Tropotox Plus Tundra Turboprop Unity	Attain, XC Deploy ¹ Dichlorprop DyVel DSp ¹ Etaprop Plus Infinity ¹ Nimble ¹ Prestige, XC Refine M ¹ Refine SG ¹ Triton C Turboprop ³	Ally + 2,4-D Ally + MCPA Assert FL Banvel II Curtail M Dichlorprop-D DyVel 2,4-D Etaprop Plus Express SG Express Pro Frontline MCPA (all forms) Nuance Prestige, XC Refine SG + Mixes Stellar Triton K Turboprop
Wheat (C - CLEARFIELD wheat)	Achieve Liquid Gold Adrenalin SC (C) Accurate Ally Altitude FX (C) Approve Assert FL Attain, XC Badge Banvel II Basagran ² + 2,4-D Benchmark Broadband ¹ Brotex 240 Buctril M Caliber 400 Clovite Plus Cobutox 600 Curtail M Cypress Deploy Dichlorprop-D DyVel DyVel DSp	2,4-D 2,4-DB Embutox 625 Etaprop Plus Everest Express SG Express Pro Frontline Frontline 2,4-D Harmony K ¹ Harmony SG Harmony Total Horizon BTM Infinity Leader Linuron 480 + MCPA Logic M Lorox + MCPA MCPA ¹ (all forms) Mextrol Nimble Nuance Prestige, XC	Pulsar ¹ Refine M Refine SG Sencor Signal D Signal M Simplicity Spectrum Stellar Sword Target Thrasher Thumper Titanium Topside Tracker XP Triton C Triton K Trophy ² Tropotox Plus Tundra Turboprop Unity Velocity m3	Attain, XC Deploy ¹ Dichlorprop ³ DyVel DSp ¹ Etaprop Plus Harmony K ^{1,2} Harmony SG ¹ Harmony Total ¹ Infinity ¹ Nimble ¹ Prestige, XC Refine M ¹ Refine SG ¹ Triton C Turboprop ³	Adrenalin SC (C) Ally + Mixes Assert FL Curtail M Dichlorprop-D DyVel 2,4-D Etaprop Plus Express SG Express Pro Frontline MCPA (all forms) Nuance Prestige, XC Refine SG + 2,4-D Refine SG + MCPA Stellar Triton K Turboprop Velocity m3
Oats	Badge Banvel II Brotex 240 Buctril M Caliber 400 Clovite Plus Cobutox 600 Curtail M Deploy	DyVel 2,4-DB Embutox 625 Frontline Linuron 480 + MCPA Logic M Lorox + MCPA MCPA ¹ (all forms)	Mextrol Nimble Refine M Refine SG Spectrum Sword Target Topside Tracker XP Tropotox Plus	Deploy ¹ Nimble ¹ Refine M ¹ Refine SG ¹	Banvel II Curtail M DyVel Frontline MCPA (all forms)
Fall Rye (spring application)	Achieve Liquid Gold Badge Brotex 240	Buctril M Clovite Plus 2,4-D Logic M	MCPA ¹ (all forms) Mextrol Topside Tropotox Plus		2,4-D MCPA (all forms)
Triticale	Infinity			Infinity ¹	

¹ Suppression only² All spring wheat except durum³ All spring wheats (including durum when tank mixed with 2,4-D ester)⁴ See page 41 for resistance information⁵ Top growth control⁶ Spring rosettes only⁷ Registered on a limited number of varieties, refer to label

Herbicide Selector Chart - Cereals

Crop	Russian Thistle ¹		Scentless Chamomile	Shepherd's-purse		
Barley	Achieve Liquid Gold Accurate ¹ Ally ¹ Approve Attain, XC Badge Benchmark Bromotril Brotex 240 Buctril M Deploy Dichlorprop-D DyVel DyVel DSp 2,4-D Etaprop Plus Express SG Express Pro Nuance Fortress ¹	Infinity Koril Leader Logic M Mextrol Nimble Pardner Pulsar Refine M Refine SG Rival 10G Sencor Sword Target Thrasher Thumper Titanium Tracker XP Triton C Tundra Turboprop	Achieve Liquid Gold Accurate Ally Badge Buctril M Curtail M Deploy ¹ Hoe-Grass II Logic M Lontrel Mextrol Nimble Prestige, XC Refine M ¹ Refine SG ¹ Titanium Triton C ¹	Achieve Liquid Gold Accurate Ally Approve Assert FL Attain, XC Badge Banvel II + 2,4-D Banvel II + MCPA Benchmark Broadband Buctril M Caliber 400 Clovitox Plus Cobutox 600 Curtail M	Deploy Dichlorprop-D DyVel DyVel DSp 2,4-D Embutox 625 Etaprop Plus Express SG Express Pro Frontline Infinity Leader Linuron 480 + MCPA Logic M Lorox + MCPA MCPA (all forms) Mextrol Nimble	Nuance Prestige, XC Refine M Refine SG Spectrum Stellar Sword Target Thrasher Thumper Titanium Topside Tracker XP Triton C Triton K Trophy Tropotox Plus Tundra Turboprop Unity
Wheat (C - CLEARFIELD wheat)	Achieve Liquid Gold Accurate ¹ Adrenalin SC (C) Ally ¹ Approve Attain, XC Badge Banvel II Basagran ² + 2,4-D Benchmark Bromotril Brotex 240 Buctril M Cypress Deploy Dichlorprop-D DyVel DyVel DSp 2,4-D Etaprop Plus Express SG Express Pro Fortress ¹ Frontline 2,4-D Harmony K ³	Harmony SG Harmony Total Horizon BTM Infinity Koril Leader Logic M Mextrol Nimble Nuance Pardner Pulsar Refine M Refine SG Sencor Signal D Signal M Sword Target Thrasher Thumper Titanium Tracker XP Triton C Tundra Turboprop Velocity m3	Achieve Liquid Gold Accurate Ally Badge Buctril M Curtail M Deploy ¹ Hoe-Grass II Logic M Lontrel Mextrol Nimble Prestige, XC Refine M ¹ Refine SG ¹ Signal M Titanium Triton C ¹	Achieve Liquid Gold Accurate Adrenalin SC (C) Ally Altitude FX (C) Approve Assert FL Attain, XC Badge Banvel II + 2,4-D Banvel II + MCPA Basagran ² + 2,4-D Benchmark Broadband Buctril M Caliber 400 Clovitox Plus Cobutox 600 Curtail M Cypress Deploy	Dichlorprop-D DyVel DyVel DSp 2,4-D 2,4-DB Embutox 625 Etaprop Plus Everest ⁴ Express SG Express Pro Frontline Frontline 2,4-D Harmony K ³ Harmony SG Harmony Total Horizon BTM Infinity Leader Linuron 480 + MCPA Logic M Lorox + MCPA MCPA (all forms) Mextrol Nimble	Nuance Prestige, XC Refine M Refine SG Sencor Signal D Signal M Spectrum Stellar Sword Target Thrasher Thumper Titanium Topside Tracker XP Triton C Triton K Trophy ⁵ Tropotox Plus Tundra Turboprop Unity Velocity m3
Oats	Badge Bromotril Brotex 240 Buctril M Deploy DyVel Koril Logic M	Mextrol Nimble Pardner Refine M Refine SG Sword Target Tracker XP	Badge Buctril M Curtail M Deploy ¹ Logic M Lontrel Mextrol Nimble Refine M ¹ Refine SG ¹	Badge Buctril M Caliber 400 Clovitox Plus Cobutox 600 Curtail M Deploy DyVel 2,4-DB	Embutox 625 Frontline Linuron 480 + MCPA Logic M Lorox + MCPA MCPA (all forms) Mextrol Nimble	Refine M Refine SG Spectrum Sword Target Topside Tracker XP Tropotox Plus
Fall Rye (spring application)	Achieve Liquid Gold Badge Bromotril Brotex 240 Buctril M	2,4-D Koril Logic M Mextrol Pardner	Achieve Liquid Gold Badge Buctril M Logic M Mextrol	Achieve Liquid Gold Badge Buctril M	Clovitox Plus 2,4-D Logic M MCPA (all forms)	Mextrol Topside Tropotox Plus
Triticale	Bromotril Brotex 240 Infinity	Koril Pardner	Hoe-Grass II	Infinity		

¹ Suppression only

² All spring wheat except durum

³ All spring wheats (including durum when tank mixed with 2,4-D ester)

⁴ See page 41 for resistance information

⁵ Top growth control

⁶ Spring rosettes only

⁷ Registered on a limited number of varieties, refer to label

Herbicide Selector Chart – Cereals

Crop	Stinkweed				Stork's-bill	
Barley	Achieve Liquid Gold	Cobutox 600	Koril	Spectrum	Accurate	Lorox + MCPA
	Accurate	Curtail M	Leader	Stellar	Ally	Nimble ¹
	Ally	Deploy	Linuron 480 +	Sword	Assert FL ¹	Prestige, XC
	Approve	Dichlorprop-D	MCPA	Target	Attain, XC	Pulsar ¹
	Assert	DyVel	Logic M	Thrasher	Deploy ¹	Refine M ¹
	Assert FL	DyVel DSp	Lorox + MCPA	Thumper	Dichlorprop-D	Refine SG ¹
	Attain, XC	2,4-D	MCPA (all forms)	Titanium	Estaprop Plus	Spectrum
	Badge	2,4-DB	Mextrol	Topside	Frontline ¹	Stellar ¹
	Benchmark	Embutox 625	Nimble	Tracker XP	Linuron 480 +	Triton C ¹
	Broadband	Estaprop Plus	Nuance	Triton C	MCPA	Trophy ¹
	Bromotril	Express SG	Pardner	Triton K		Turboprop
	Brotax 240	Express Pro	Prestige, XC	Trophy		
	Buctril M	Frontline	Refine M	Tropotox Plus		
	Caliber 400	Hoe-Grass II	Refine SG	Tundra		
	Clovitox Plus	Infinity	Sencor	Turboprop		
				Unity		
Wheat (C - CLEARFIELD wheat)	Achieve Liquid Gold	Clovitox Plus	Hoe-Grass II	Spectrum	Accurate	Harmony Total ¹
	Accurate	Cobutox 600	Horizon BTM	Stellar	Ally	Linuron 480 +
	Adrenalin SC (C)	Curtail M	Infinity	Sword	Altitude FX ¹ (C)	MCPA
	Ally	Cypress	Koril	Target	Assert FL ¹	Lorox + MCPA
	Altitude FX (C)	Deploy	Leader	Thrasher	Attain, XC	Nimble ¹
	Approve	Dichlorprop-D	Linuron 480 +	Thumper	Basagran ² +	Prestige, XC
	Assert	DyVel	MCPA	Titanium	2,4-D	Pulsar ¹
	Assert FL	DyVel DSp	Logic M	Topside	Deploy ¹	Refine M ¹
	Attain, XC	2,4-D	Lorox + MCPA	Tracker XP	Dichlorprop-D	Refine SG ¹
	Badge	2,4-DB	MCPA (all forms)	Triton C	Estaprop Plus	Spectrum
	Banvel II +	Embutox 625	Mextrol	Triton K	Frontline ¹	Stellar ¹
	Sencor	Estaprop Plus	Nimble	Trophy ¹	Harmony K ^{1,2}	Triton C ¹
	Basagran ² +	Everest	Nuance	Tropotox Plus	Harmony SG ¹	Trophy ^{1,2}
	2,4-D	Express SG	Pardner	Tundra		Turboprop
	Benchmark	Express Pro	Prestige, XC	Turboprop		
	Broadband	Frontline	Refine M	Unity		
	Bromotril	Frontline 2,4-D	Refine SG	Velocity m3		
Oats	Badge	Cobutox 600	Linuron 480 +	Refine M	Deploy ¹	Lorox + MCPA
	Banvel II	Curtail M	MCPA	Refine SG	Frontline ¹	Nimble ¹
	Bromotril	Deploy	Logic M	Spectrum	Linuron 480 +	Refine M ¹
	Brotax 240	DyVel 2,4-DB	Lorox + MCPA	Sword	MCPA	Refine SG ¹
	Buctril M	Embutox 625	MCPA (all forms)	Target		Spectrum
	Caliber 400	Frontline	Mextrol	Topside		
	Clovitox Plus	Koril	Nimble	Tracker XP		
Fall Rye (spring application)	Achieve Liquid Gold	Brotax 240	Koril	Pardner		
	Badge	Buctril M	Logic M	Topside		
	Bromotril	Clovitox Plus	MCPA (all forms)	Tropotox Plus		
		2,4-D	Mextrol			
Triticale	Bromotril	Hoe-Grass II	Koril	Pardner		
	Brotax 240	Infinity				

¹ Suppression only² All spring wheat except durum³ All spring wheats (including durum when tank mixed with 2,4-D ester)⁴ See page 41 for resistance information⁵ Top growth control⁶ Spring rosettes only⁷ Registered on a limited number of varieties, refer to label

Herbicide Selector Chart – Cereals

Crop	Tall Buttercup	Tartary Buckwheat	Toadflax
Barley	Clovitox Plus ¹ MCPA amine MCPA Na-salt Topside ² Tropotox Plus ³	Achieve Liquid Gold Accurate Ally Approve Assert ⁴ Attain, XC Badge Banvel II Benchmark Bromotril Brotex 240 Buctril M Curtail M Deploy	Dichlorprop-D DyVel DyVel DSp Estaprop Plus Hoe-Grass II Koril Leader Linuron 480 + MCPA Logic M Lorox + MCPA MCPA ⁵ (all forms) Mextrol Nimble Pardner Prestige, XC Refine M Refine SG Sencor Sword Target Thrasher Thumper Titanium Tracker XP Triton C Turboprop
Wheat (C - CLEARFIELD wheat)	Clovitox Plus ¹ MCPA amine MCPA Na-salt Topside ² Tropotox Plus ³	Achieve Liquid Gold Accurate Adrenalin SC ⁶ (C) Ally Approve Assert ⁴ Attain, XC Badge Banvel II Benchmark Bromotril Brotex 240 Buctril M Curtail M Cypress Deploy	Dichlorprop-D DyVel DyVel DSp Estaprop Plus Frontline 2,4-D Harmony K ⁷ Harmony SG Harmony Total Hoe-Grass II Horizon BTM Koril Leader Linuron 480 + MCPA Logic M Lorox + MCPA MCPA ⁵ (all forms) Mextrol Nimble Pardner Prestige, XC Refine M Refine SG Sencor Signal D Signal M Sword Target Thrasher Thumper Titanium Tracker XP Triton C Turboprop
Oats	Clovitox Plus ¹ MCPA amine MCPA Na-salt Topside ² Tropotox Plus ³	Badge Banvel II Bromotril Brotex 240 Buctril M Curtail M Deploy	DyVel Koril Linuron 480 + MCPA Logic M Lorox + MCPA MCPA ⁵ (all forms) Mextrol Nimble Pardner Refine M Refine SG Sword Target Tracker XP
Fall Rye (spring application)	Clovitox Plus ¹ MCPA amine MCPA Na-salt Topside ² Tropotox Plus ³	Achieve Liquid Gold Badge Bromotril	Brotex 240 Buctril M Koril Logic M MCPA ⁵ (all forms) Mextrol Pardner
Triticale		Bromotril Brotex 240	Hoe-Grass II Koril Pardner

¹ Suppression only

² All spring wheat except durum

³ All spring wheats (including durum when tank mixed with 2,4-D ester)

⁴ See page 41 for resistance information

⁵ Top growth control

⁶ Spring rosettes only

⁷ Registered on a limited number of varieties, refer to label

For more detailed selector chart information, visit www.agriculture.alberta.ca/herbicide

Herbicide Selector Chart – Cereals

Crop	Volunteer Canola, Wild Mustard, Other Mustards			Wild Buckwheat		
Barley	Achieve Liquid Gold Accurate Ally Altitude FX (C) Approve Assert FL Attain, XC Badge Banvel II + 2,4-D Banvel II + MCPA Benchmark ¹ Broadband Buctril M Clovitox Plus Curtail M	Deploy Dichlorprop-D DyVel DyVel DSp 2,4-D Etaprop Plus Express SG (canola) Express Pro (canola) Frontline Hoe-Grass II Infinity Leader Logic M Mextrol Nimble Prestige, XC	Refine SG Sencor Spectrum Stellar Sword Target Thrasher Thumper Titanium Tracker XP Triton C ² Triton K Trophy Tropotox Plus Tundra Turboprop Unity	Achieve Liquid Gold Accurate ¹ Advance Ally ¹ Approve Assert ¹ Assert FL Attain, XC Badge Banvel II Benchmark Bonanza Broadband Bromotril Brotex 240 Buctril M Caliber 400 Cobutox 600 Crossfire Curtail M Deploy	Dichlorprop-D DyVel DyVel DSp 2,4-D ¹ 2,4-DB Embutox 625 Etaprop Plus Express SG ¹ Express Pro Fortress ¹ Frontline Hoe-Grass II Infinity Leader Linuron 480 + MCPA Logic M Lontrel Lorox + MCPA MCPA ³ (all forms) Mextrol	Nimble Nuance ¹ Pardner Prestige, XC Pulsar Refine M Refine SG Rival 10G Spectrum Stellar Sword Target Thrasher Thumper Titanium Tracker XP Triton C Triton K ¹ Trophy ¹ Tundra Turboprop Unity
Wheat (C - CLEARFIELD wheat)	Achieve Liquid Gold Accurate Adrenalin SC (C) Ally Altitude FX (C) Approve Assert FL Attain, XC Badge Banvel II + 2,4-D Banvel II + MCPA Basagran ² + 2,4-D Benchmark ¹ Buctril M Clovitox Plus Curtail M Cypress Deploy Dichlorprop-D	DyVel DyVel DSp 2,4-D Etaprop Plus Everest ⁴ Express SG (canola) Express Pro (canola) Frontline Frontline 2,4-D Harmony K ² Harmony SG Harmony Total Hoe-Grass II Horizon BTM Infinity Leader Logic M Mextrol Nimble Prestige, XC Refine M	Refine SG Sencor Signal D Signal M Simplicity ⁶ Spectrum Stellar Sword Target Thrasher Thumper Titanium Tracker XP Triton C ² Triton K Trophy ² Tropotox Plus Tundra Turboprop Unity Velocity m3	Achieve Liquid Gold Accurate ¹ Adrenalin SC (C) Ally ¹ Altitude FX (C) Approve Assert ¹ Assert FL Attain, XC Badge Banvel II Benchmark Broadband Bromotril Brotex 240 Buctril M Caliber 400 Cobutox 600 Crossfire ² Curtail M Cypress Deploy Dichlorprop-D DyVel DyVel DSp	2,4-D ¹ 2,4-DB Embutox 625 Etaprop Plus Express SG ¹ Express Pro Fortress ¹ Frontline Frontline 2,4-D Harmony K ² Harmony SG Harmony Total Hoe-Grass II Horizon BTM Infinity Koril Leader Linuron 480 + MCPA Logic M Lontrel Lorox + MCPA MCPA ³ (all forms) Mextrol Nimble	Nuance ¹ Pardner Prestige, XC Pulsar Refine M Refine SG Signal D Signal M Simplicity ¹ Spectrum Stellar Sword Target Thrasher Thumper Titanium Tracker XP Triton C Triton K ¹ Trophy ¹ ² Tundra Turboprop Unity Velocity m3
Oats	Badge Banvel II + 2,4-D Banvel II + MCPA Buctril M Clovitox Plus	Curtail M Deploy DyVel Frontline Logic M Mextrol Nimble	Refine M Refine SG Spectrum Sword Target Tracker XP Tropotox Plus	Badge Banvel II Bromotril Brotex 240 Buctril M Caliber 400 Cobutox 600 Curtail M Deploy DyVel	2,4-DB Embutox 625 Frontline Koril Linuron 480 + MCPA Logic M Lontrel Lorox + MCPA MCPA ³ (all forms)	Mextrol Nimble Pardner Refine M Refine SG Spectrum Sword Target Tracker XP
Fall Rye (spring application)	Achieve Liquid Gold Badge	Buctril M Clovitox Plus 2,4-D	Logic M Mextrol Tropotox Plus	Achieve Liquid Gold Badge Bromotril	Brotex 240 Buctril M 2,4-D ¹ Koril	Logic M MCPA ³ (all forms) Mextrol Pardner
Triticale	Hoe-Grass II	Infinity		Bromotril Brotex 240	Hoe-Grass II Infinity	Koril Pardner

¹ Suppression only

² All spring wheat except durum

³ All spring wheats (including durum when tank mixed with 2,4-D ester)

⁴ See page 41 for resistance information

⁵ Top growth control

⁶ Spring rosettes only

⁷ Registered on a limited number of varieties, refer to label

For more detailed selector chart information, visit www.agriculture.alberta.ca/herbicide

Herbicide Selector Chart - Cereals

Crop	Wild Oats ⁴		Wild Radish
Barley	Achieve Liquid Gold Advance 10G Assert Assert FL Avadex BW Avenge Axial Bonanza Bison Broadband Cordon	Express SG Express Pro Fortress Hoe-Grass II Liquid Achieve SC Marengo Puma ^{1,23} Super Puma Advance Rival 10G Titanium Treflan EC1 Tundra Wildcat	Attain, XC Banvel II + 2,4-D Banvel II + MCPA Clovitox Plus ¹ Cobutox 600 DyVel 2,4-D Express SG Express Pro MCPA (all forms) Nuance Stellar Topside Trophy Tropotox Plus
Wheat (C - CLEARFIELD wheat)	Achieve Liquid Gold Adrenalin SC (C) Altitude FX (C) Assert Assert FL Avadex BW Avenge ¹ Axial Bengal Bison Broadband Cordon Cypress Everest Express SG Express Pro Foothills Fortress	Harmony K2 Harmony SG Harmony Total Hoe-Grass II Horizon NG Horizon BTM Ladder Liquid Achieve SC Marengo Nextstep Puma ^{1,23} Super Puma Advance Signal Signal D Signal M Titanium Tundra Velocity m3 Wildcat	Adrenalin SC (C) Altitude FX (C) Attain, XC Banvel II + 2,4-D Banvel II + MCPA Basagran ² + 2,4-D Clovitox Plus ¹ Cobutox 600 DyVel 2,4-D Express SG Express Pro Frontline 2,4-D MCPA (all forms) Nuance Stellar Topside Trophy ² Tropotox Plus
Oats			Banvel II + 2,4-D Banvel II + MCPA Clovitox Plus ¹ Cobutox 600 DyVel MCPA (all forms) Topside Tropotox Plus
Fall Rye (spring application)	Achieve Liquid Gold Avenge ¹	Bison Liquid Achieve SC Marengo	Clovitox Plus ¹ 2,4-D MCPA (all forms) Topside Tropotox Plus
Triticale	Hoe-Grass II	Bison Liquid Achieve SC Marengo	

¹ Suppression only

² All spring wheat except durum

³ All spring wheats (including durum when tank mixed with 2,4-D ester)

⁴ See page 41 for resistance information

⁵ Top growth control

⁶ Spring rosettes only

⁷ Registered on a limited number of varieties, refer to label

Herbicide Selector Chart -- Oilseeds

Oilseeds

Crop	Annual Smartweed/ Lady's Thumb	Annual Sow-thistle	Barnyard Grass		Bluebur	Canada Thistle
Canola	Edge ¹ Muster Muster Gold II		Advance 10G Arrow 240 EC Assure II Bonanza Centurion Edge Fusion	Muster Gold II Poast Ultra Rival Select Treflan Yuma		Lontrel
Clearfield Canola	Absolute Odyssey		Absolute Odyssey	Odyssey DLX Solo		Absolute
Liberty Link Canola	Liberty	Liberty	Liberty			Liberty
Roundup Ready Canola	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC	Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II		Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II
Flax	Badge Basagran Basagran Forte Bromotril Brotex Buctril M FlaxMax DLX Hoe-Grass II Koril Logic M MCPA (all forms) Mextrol Pardner	Curtail M MCPA (all forms) FlaxMax DLX	Advance 10G Arrow 240 EC Assure II Bonanza Centurion Eptam	Fusion Hoe-Grass II Poast Ultra Rival Select Treflan Yuma	Badge Bromotril Brotex Buctril M Koril Logic M MCPA (all forms) Mextrol Pardner	Badge ¹ Basagran ¹ Basagran Forte ¹ Buctril M ¹ Curtail M ¹ FlaxMax DLX Logic M ¹ Lontrel MCPA ¹ (all forms) Mextrol ¹
Mustard	Edge ¹ (yellow only) Muster (brown and oriental only)		Advance 10G Arrow 240 EC Bonanza Centurion Edge (yellow only)	Fusion Poast Ultra Rival Select Treflan		
Sunflowers	Edge ¹		Advance 10G Arrow 240 EC Bonanza Centurion Edge Eptam	Poast Ultra Rival Select Solo (C) Treflan		

¹ Suppression only

² Pre-crop emergence to weed seedlings

³ Used as a crop desiccant

⁴ See page 41 for resistance information

⁵ Spring seedlings

(C) Clearfield sunflowers only

For more detailed selector chart information, visit www.agriculture.alberta.ca/herbicide

Herbicide Selector Chart – Oilseeds

Crop	Cleavers	Common Chickweed	Common Groundsel	Corn Spurry	Cow Cockle	Dandelion
Canola	Edge ¹	Advance 10G Bonanza Edge Rival Treflan	Lontrel	Edge	Advance 10G Bonanza Edge Rival Treflan	
Clearfield Canola	Absolute Odyssey Odyssey DLX Solo ¹	Absolute Odyssey Odyssey DLX			Solo	
Liberty Link Canola	Liberty	Liberty			Liberty	Liberty
Roundup Ready Canola	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II		Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II
Flax	Basagran Basagran Forte	Advance 10G Basagran Basagran Forte Bonanza Eptam MCPA amine MCPA Na-salt Rival Treflan	Badge Basagran Basagran Forte Bromotril Brotex Buctril M Curtail M FlaxMax DLX Hoe-Grass II Koril Logic M Lontrel MCPA amine Mextrol Pardner	Basagran Basagran Forte Eptam	Advance 10G Badge Bonanza Bromotril Brotex Buctril M Hoe-Grass II Koril Logic M Mextrol Pardner Rival Treflan	Curtail M FlaxMax DLX ² MCPA ³ (all forms)
Mustard	Edge ¹ (yellow only)	Advance 10G Bonanza Edge (yellow only) Rival Treflan		Edge (yellow only)	Advance 10G Bonanza Edge (yellow only) Rival Treflan	
Sunflowers	Edge ¹ Solo (C) ¹	Advance 10G Bonanza Edge Eptam Rival Treflan		Edge Eptam	Advance 10G Bonanza Edge Rival Solo (C) Treflan	

¹ Suppression only

² Pre-crop emergence to weed seedlings

³ Used as a crop desiccant

⁴ See page 41 for resistance information

⁵ Spring seedlings

(C) Clearfield sunflowers only

Herbicide Selector Chart - Oilseeds

Crop	Field Bindweed	Field Horsetail	Flixweed	Green Foxtail ⁴		Hemp-nettle
Canola			Muster ⁵ Muster Gold II ⁵	Advance 10G Arrow 240 EC Assure II Bonanza Centurion Edge Equinox Fortress	Fusion Muster Gold II Poast Ultra Rival Select Treflan Yuma	Edge ¹ Muster Muster Gold II
Clearfield Canola			Absolute Odyssey Odyssey DLX	Absolute Equinox Odyssey	Odyssey DLX Solo	Absolute Odyssey Odyssey DLX ¹
Liberty Link Canola			Liberty	Liberty Equinox		Liberty
Roundup Ready Canola	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II		Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC	Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II
Flax	Basagran ¹ Basagran Forte ¹ MCPA ¹ (all forms)	MCPA ester MCPA K-salt ¹	Badge Buctril M Curtail M FlaxMax DLX Logic M MCPA (all forms) Mextrol	Advance 10G Arrow 240 EC Assure II Bonanza Centurion Eptam Equinox FlaxMax DLX	Fortress Fusion Hoe-Grass II Poast Ultra Rival Select Treflan Yuma	MCPA (all forms)
Mustard			Muster ⁵ (brown and oriental only)	Advance 10G Arrow 240 EC Bonanza Centurion Edge (yellow only) Fortress	Fusion Rival Poast Ultra Select Treflan	Edge ¹ (yellow only) Muster (brown and oriental only)
Sunflowers				Advance 10G Arrow 240 EC Bonanza Centurion Edge Eptam	Poast Ultra Rival Select Solo (C) Treflan	Edge ¹

¹ Suppression only

² Pre-crop emergence to weed seedlings

³ Used as a crop desiccant

⁴ See page 41 for resistance information

⁵ Spring seedlings

(C) Clearfield sunflowers only

For more detailed selector chart information, visit www.agriculture.alberta.ca/herbicide

Herbicide Selector Chart - Oilseeds

Crop	Knotweed	Kochia	Lady's Thumb/ Annual Smartweed	Lamb's-quarters	Narrow-leaved Hawk's-beard
Canola	Advance 10G Bonanza Rival Treflan	Edge Fortress ¹	Edge ¹	Advance 10G Bonanza Edge Fortress ¹ Rival Treflan	
Clearfield Canola		Absolute ¹ Odyssey ¹ Odyssey DLX ¹ Solo ¹	Absolute Odyssey Odyssey DLX	Absolute ¹ Odyssey ¹ Odyssey DLX ¹ Solo	
Liberty Link Canola			Liberty	Liberty	
Roundup Ready Canola	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II		Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II
Flax	Advance 10G Bonanza MCPA amine Rival Treflan	Badge Bromtril Brotex Buctril M Curtail M ¹ Fortress ¹ Hoe-Grass II Koril Logic M MCPA amine MCPA ester MCPA K-salt MCPA Na-salt Mextrol Pardner	Badge Basagran Basagran Forte Bromtril Brotex Buctril M FlaxMax DLX Hoe-Grass II Koril Logic M Mextrol Pardner	Advance 10G Badge Basagran Basagran Forte Bonanza Bromtril Brotex Buctril M Curtail M Eptam Fortress ¹ FlaxMax DLX Hoe-Grass II Koril Logic M MCPA (all forms) Mextrol Pardner Rival Treflan	
Mustard	Advance 10G Bonanza Rival Treflan	Edge (yellow only) Fortress ¹	Edge ¹ (yellow only)	Advance 10G Bonanza Edge (yellow only) Fortress ¹ Rival Treflan	
Sunflowers	Advance 10G Bonanza Rival Treflan	Edge Solo (C) ¹	Edge ¹	Advance 10G Bonanza Edge Eptam Rival Solo (C) Treflan	

¹ Suppression only

² Pre-crop emergence to weed seedlings

³ Used as a crop desiccant

⁴ See page 41 for resistance information

⁵ Spring seedlings

(C) Clearfield sunflowers only

Herbicide Selector Chart – Oilseeds

Crop	Night-flowering Catchfly	Perennial Sow-thistle	Persian Dandelion	Prostrate Pigweed	Quack Grass
Canola		Lontrel ¹	Advance 10G Arrow 240 EC Bonanza Centurion Fusion Poast Ultra Rival Select Treflan	Edge	Arrow 240 EC Assure II Centurion Equinox Muster Gold II ¹ Poast Ultra Select Yuma
Clearfield Canola		Absolute	Absolute Odyssey Odyssey DLX		Equinox
Liberty Link Canola		Liberty	Liberty		Liberty ¹
Roundup Ready Canola	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II		Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II
Flax	Badge Buctril M Hoe-Grass II Logic M Mextrol	Badge ¹ Buctril M ¹ Curtail M FlaxMax DLX Logic M ¹ Lontrel ¹ MCPA ¹ (all forms) Mextrol ¹	Advance 10G Arrow 240 EC Bonanza Centurion Fusion Hoe-Grass II Poast Ultra Rival Select Treflan	Eptam MCPA K-salt	Arrow 240 EC Assure II Centurion Eptam Equinox Poast Ultra Select Yuma
Mustard			Advance 10G Arrow 240 EC Bonanza Centurion Fusion Poast Ultra Rival Select Treflan	Edge (yellow only)	Arrow 240 EC Centurion Select Poast Ultra
Sunflowers			Advance 10G Arrow 240 EC Bonanza Centurion Poast Ultra Rival Select Treflan	Edge Eptam	Arrow 240 EC Centurion Eptam Poast Ultra Select

¹ Suppression only

² Pre-crop emergence to weed seedlings

³ Used as a crop desiccant

⁴ See page 41 for resistance information

⁵ Spring seedlings

(C) Clearfield sunflowers only

Herbicide Selector Chart – Oilseeds

Crop	Redroot Pigweed	Russian Thistle ⁴	Scentless Chamomile	Shepherd's-purse	Stinkweed
Canola	Edge Fortress ¹ Muster	Bonanza Edge ¹ Fortress ¹ Rival	Lontrel		Muster Muster Gold II
Clearfield Canola	Absolute Odyssey Odyssey DLX Solo	Absolute Odyssey Odyssey DLX		Absolute Odyssey Solo	Absolute Odyssey Odyssey DLX Solo
Liberty Link Canola	Liberty	Liberty	Liberty	Liberty	Liberty
Roundup Ready Canola	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II		Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II
Flax	Badge Basagran ¹ Basagran Forte ¹ Buctril M Curtail M Eptam FlaxMax DLX Hoe-Grass II Logic M MCPA (all forms) Mextrol	Badge Basagran Basagran Forte ¹ Bonanza Bromotril Brotex Buctril M Fortress ¹ Hoe-Grass II Koril Logic M MCPA Na-salt Mextrol Pardner Rival	Badge ¹ Buctril M ¹ Curtail M FlaxMax DLX Hoe-Grass II Logic M Lontrel Mextrol ¹	Badge Basagran Basagran Forte Buctril M Curtail M FlaxMax DLX Logic M MCPA (all forms) Mextrol	Badge Basagran Basagran Forte Bromotril Brotex Buctril M Curtail M FlaxMax DLX Hoe-Grass II Koril Logic M MCPA (all forms) Mextrol Pardner
Mustard	Edge (yellow only) Fortress ¹ Muster ¹ (brown and oriental only)	Bonanza Edge ¹ (yellow only) Fortress ¹ Rival			Muster ¹ (brown and oriental only)
Sunflowers	Edge Eptam Solo (C)	Bonanza Edge ¹ Rival		Solo (C)	Assert Solo (C)

¹ Suppression only

² Pre-crop emergence to weed seedlings

³ Used as a crop desiccant

⁴ See page 41 for resistance information

⁵ Spring seedlings

(C) Clearfield sunflowers only

Herbicide Selector Chart – Oilseeds

Crop	Stork's-bill	Tartary Buckwheat	Volunteer Barley	Wild Mustards	Volunteer Oats ⁴
Canola			Arrow 240 EC Assure II Centurion Edge ¹ Equinox Fusion Muster Gold II Poast Ultra Select Yuma	Muster Muster Gold II	Arrow 240 EC Assure II Centurion Equinox Muster Gold II Poast Ultra Select Yuma
Clearfield Canola	Absolute Odyssey Odyssey DLX		Absolute Equinox Odyssey Odyssey DLX Solo	Absolute Odyssey Odyssey DLX Solo	Absolute Equinox Odyssey Odyssey DLX Solo
Liberty Link Canola	Liberty		Liberty Equinox	Liberty	Equinox
Roundup Ready Canola	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II		Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II
Flax	Basagran Basagran Forte	Badge Bromotril Brotex Buctril M Curtail M FlaxMax DLX Hoe-Grass II Koril Logic M MCPA ¹ (all forms) Mextrol Pardner	Arrow 240 EC Assure Centurion Eptam Equinox FlaxMax DLX Fusion Poast Ultra Select Yuma	Badge Basagran Basagran Forte Buctril M Curtail M FlaxMax DLX Hoe-Grass II Logic M MCPA (all forms) Mextrol	Arrow 240 EC Assure II Centurion Eptam Hoe-Grass II Poast Ultra Select Yuma
Mustard			Arrow 240 EC Centurion Edge ¹ (yellow only) Fusion Poast Ultra Select	Muster (brown and oriental only)	Arrow 240 EC Centurion Poast Ultra Select
Sunflowers			Arrow 240 EC Centurion Edge ¹ Eptam Poast Ultra Select Solo (C)	Assort Solo (C)	Arrow 240 EC Centurion Eptam Poast Ultra Select Solo (C)

¹ Suppression only

² Pre-crop emergence to weed seedlings

³ Used as a crop desiccant

⁴ See page 41 for resistance information

⁵ Spring seedlings

(C) Clearfield sunflowers only

Herbicide Selector Chart – Oilseeds

Crop	Volunteer Wheat	Wild Buckwheat	Wild Oats ⁴	Wild Tomato	Witchgrass
Canola	Arrow 240 EC Assure II Centurion Edge Equinox Fusion Muster Gold II Poast Ultra Select Yuma	Advance 10G Bonanza Edge Fortress ¹ Lontrel Rival Treflan	Advance 10G Arrow 240 EC Assure II Avadex BW Bonanza Centurion Edge ¹ Equinox Fortress	Fusion Muster Gold II Poast Ultra Rival Select Treflan Yuma	Arrow 240 EC Assure II Centurion Edge Poast Ultra Select Yuma
Clearfield Canola	Absolute Equinox Odyssey Odyssey DLX Solo ²	Absolute Odyssey Odyssey DLX Solo ²	Absolute Equinox Odyssey Odyssey DLX	Solo	
Liberty Link Canola	Liberty Equinox	Liberty	Liberty Equinox		
Roundup Ready Canola	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC	Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II	Credit Eclipse Factor 540 Glyphos Maverick III Roundup Transorb HC Roundup Ultra2 Roundup Weather Max R/T 540 Sharpshooter Plus Touchdown Total Vantage Plus Max II
Flax	Arrow 240 EC Assure Centurion Eptam Equinox FlaxMax DLX Fusion Poast Ultra Select Yuma	Advance 10G Badge Bonanza Bromotril Brotex Buctril M Curtail M Fortress ¹ FlaxMax DLX Hoe-Grass II Koril Logic M Lontrel MCPA Amine ³ Mextrol Pardner Rival Treflan	Advance 10G Arrow 240 EC Assure II Avadex BW Bonanza Centurion Eptam Equinox Yuma	FlaxMax DLX Fortress Fusion Hoe-Grass II Poast Ultra Rival Select Treflan	Badge Buctril M Logic M Mextrol
Mustard	Arrow 240 EC Centurion Edge ¹ (yellow only) Fusion Poast Ultra Select	Advance 10G Bonanza Edge (yellow only) Fortress ¹ Rival Treflan	Advance 10G Arrow 240 EC Avadex BW Bonanza Centurion Edge ¹ (yellow only) Fortress	Fusion Poast Ultra Rival Select Treflan	Arrow 240 EC Centurion Edge Poast Ultra Select
Sunflowers	Arrow 240 EC Centurion Edge ¹ Eptam Post Ultra Select Solo (C) ³	Advance 10G Bonanza Edge Rival Solo (C) ³ Treflan	Advance 10G Arrow 240 EC Bonanza Centurion Edge ¹ Eptam	Post Ultra Rival Select Solo (C) Treflan	Arrow 240 EC Centurion Edge Eptam Post Ultra Select

¹ Suppression only

² Pre-crop emergence to weed seedlings

³ Used as a crop desiccant

⁴ See page 41 for resistance information

⁵ Spring seedlings

(C) Clearfield sunflowers only

Herbicide Selector Chart – Forage Legumes

Forage Legumes

Crop	Crop Stage	Annual Smartweed	Barnyard Grass		Bluebur	Canada Thistle	
Alfalfa	Seedling	Basagran ⁵ Bromotril ⁶ Brotex 240 ⁵ Caliber 400 ¹ Cobutox 600 ¹ Embutox 625 ¹ Koril ⁶ Odyssey ⁵ Pardner ⁵ Pursuit	Advance ² Arrow 240 EC Bonanza ² Centurion Edge ^{5,2} Eptam ² Hoe-Grass 284	Liquid Achieve SC ⁷ Odyssey ⁵ Poast Ultra Rival ² Select Treflan ²	Bromotril ⁶ Brotex 240 ⁵ Koril ⁶ Pardner ⁵	Amitrol 240 ⁶ Basagran ^{1,5} Caliber 400 ¹ Clovitox Plus ^{1,5} Cobutox 600 ¹	Embutox 625 ¹ Glyphosate ⁶ Topside ^{1,5} Tropotox Plus ^{1,5}
	Established	Basagran ⁵ Bromotril ⁶ Brotex 240 ⁵ Koril ⁶ Odyssey ⁵ Pardner ⁵ Princep Reglone ³ Sencor ⁴	Assure II ⁶ Odyssey ⁵ Poast Ultra	Princep Reglone ³ Yuma ⁵	Bromotril ⁶ Brotex 240 ⁵ Koril ⁶ Pardner ⁵ Reglone ³	Amitrol 240 ⁶ Basagran ^{1,5}	Glyphosate ⁶ Reglone ³
Alsike Clover	Seedling	Basagran ⁵ Caliber 400 ¹ Cobutox 600 ¹ Embutox 625 ¹	Bonanza ² Hoe-Grass 284 ⁵ Liquid Achieve SC ⁷	Poast Ultra Treflan ²		Amitrol 240 ⁶ Basagran ^{1,5} Caliber 400 ¹ Clovitox Plus ¹ Cobutox 600 ¹	Embutox 625 ¹ Glyphosate ⁶ Topside ¹ Tropotox Plus ¹
	Established		Poast Ultra			Amitrol 240 ⁶	Glyphosate ⁶
Cicer Milkvetch	Seedling		Bonanza ² Eptam ^{5,2}	Poast Ultra Treflan ²		Glyphosate ⁶	
	Established		Poast Ultra			Glyphosate ⁶	
Red Clover	Seedling	Basagran ⁵	Bonanza ² Hoe-Grass 284	Liquid Achieve SC ⁷ Treflan ²	MCPA amine	Amitrol 240 ⁶ Basagran ^{1,5} Clovitox Plus ¹	Glyphosate ⁶ Topside ¹ Tropotox Plus ¹
	Established	Reglone ³	Reglone ³		Reglone ³ MCPA amine	Amitrol 240 ⁶ Glyphosate ⁶	Reglone ³
Sweet Clover	Seedling		Bonanza ² Eptam ^{5,5} Hoe-Grass 284 Liquid Achieve SC ⁷	Poast Ultra Rival ² Treflan ²		Amitrol 240 ⁶	Glyphosate ⁶
	Established	Basagran ⁵	Poast Ultra			Amitrol 240 ⁶ Basagran ^{1,5}	Glyphosate ⁶
White Clover	Seedling	Caliber 400 ¹ Clovitox Plus ¹ Cobutox 600 ¹ Embutox 625 ¹ Topside ¹ Tropotox Plus ¹	Liquid Achieve SC ⁷			Amitrol 240 ⁶ Caliber 400 ¹ Clovitox Plus ¹ Cobutox 600 ¹	Embutox 625 ¹ Glyphosate ⁶ Topside ¹ Tropotox Plus ¹
	Established	Reglone ³	Reglone ³		Reglone ³	Amitrol 240 ⁶ Glyphosate ⁶	Reglone ^{3,3}
Bird's-foot Trefoil	Seedling	Caliber 400 ¹ Cobutox 600 ¹ Embutox 625 ¹	Bonanza ² Eptam ⁵ Liquid Achieve SC ⁷	Treflan ²		Caliber 400 ¹ Cobutox 600 ¹	Embutox 625 ¹ Glyphosate ⁶
	Established	Princep Reglone ³	Princep Reglone ³		Reglone ³	Reglone ³	Glyphosate ⁶
Sainfoin	Seedling	Basagran ⁵	Bonanza ² Hoe-Grass 284 ⁵ Liquid Achieve SC ⁷	Poast Ultra Rival ² Treflan ²		Basagran ^{1,5}	Glyphosate ⁶
	Established		Poast Ultra			Glyphosate ⁶	

¹ Suppression or season long control

² Pre-crop emergence herbicide

³ Used as a crop desiccant

⁴ Under irrigation only

⁵ Seed production only

⁶ Forage production only

⁷ Underseeding only

⁸ Glyphosate-based chemicals are Credit, Factor, Glyfos, Maverick, Roundup Transorb HC, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Touchdown Total, Vantage Plus Max
Note: Roundup only used as a spot treatment on legumes

Check individual herbicides for grazing or feed restrictions

Herbicide Selector Chart – Forage Legumes

Crop	Crop Stage	Chickweed	Clovers	Common Groundsel	Corn Spurry	Dandelion
Alfalfa	Seedling	Advance ² Basagran ³ Bonanza ² Edge ^{3,2} Eptam ² Odyssey ³ Rival ² Treflan ²		Basagran ³ Bromotril ³ Brotex 240 ³ Konif ³ Pardner ³ Pursuit ¹	Basagran ³ Edge ^{2,3} Eptam ²	Caliber 400 ¹ Cobutox 600 ¹ Embutox 625 ¹ Glyphosate ^{4*}
	Established	Basagran ³ Kerb Odyssey ³ Reglone ³ Sencor ⁴	Princep Reglone ³	Basagran ³ Bromotril ³ Brotex 240 ³ Pardner ³ Reglone ³ Sencor ⁴	Basagran ³ Reglone ³ Sencor ⁴	Glyphosate ^{4*} Reglone ³ Velpar ⁵
Alsike Clover	Seedling	Basagran ³ Bonanza ² Treflan ²		Basagran ³	Basagran ³	Caliber 400 ¹ Cobutox 600 ¹ Embutox 625 ¹ Glyphosate ^{4*}
	Established					Glyphosate ^{4*}
Cicer Milkvetch	Seedling	Bonanza ² Eptam ^{3,2} Treflan ²			Eptam ^{2,3}	Glyphosate ^{4*}
	Established					Glyphosate ^{4*}
Red Clover	Seedling	Basagran ³ Bonanza ² Treflan ²		Basagran ³	Basagran ³	Glyphosate ^{4*}
	Established	Reglone ³	Reglone ³	Reglone ³	Reglone ³	Glyphosate ^{4*} Reglone ³
Sweet Clover	Seedling	Bonanza ² Eptam ^{3,3} Rival ² Treflan ²			Eptam ^{2,2,3}	Glyphosate ^{4*}
	Established	Basagran ³		Basagran ³	Basagran ³	Glyphosate ^{4*}
White Clover	Seedling					Caliber 400 ¹ Cobutox 600 ¹ Embutox 625 ¹ Glyphosate ^{4*}
	Established	Reglone ³	Reglone ³	Reglone ³	Reglone ³	Glyphosate ^{4*} Reglone ³
Bird's-foot Trefoil	Seedling	Bonanza ² Eptam ³ Treflan ²			Eptam ³	Caliber 400 ¹ Cobutox 600 ¹ Embutox 625 ¹ Glyphosate ^{4*}
	Established	Kerb Reglone ³	Princep Reglone ³	Reglone ³	Reglone ³	Glyphosate ^{4*} Reglone ³
Sainfoin	Seedling	Basagran ³ Bonanza ² Rival ² Treflan ²		Basagran ³	Basagran ³	Glyphosate ^{4*}
	Established					Glyphosate ^{4*}

¹ Suppression only

² Pre-crop emergence herbicide

³ Used as a crop desiccant

⁴ Under irrigation only

⁵ Seed production only

⁶ Forage production only

⁷ Underseeding only

* Glyphosate-based chemicals are Credit, Factor, Glyfos, Maverick, Roundup Transorb HC, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Touchdown Total, Vantage Plus Max
Note: Roundup only used as a spot treatment on legumes

Check individual herbicides for grazing or feed restrictions

Herbicide Selector Chart – Forage Legumes

Crop	Crop Stage	Field Bindweed		Flixweed (seedlings)	Foxtail Barley	Green Foxtail	
Alfalfa	Seedling	Basagran ^{1,3} Caliber 400 ¹ Clovitox Plus ^{1,3} Cobutox 600 ¹	Embutox 625 ¹ Glyphosate ^{1,2} Topside ^{1,3} Tropotox Plus ^{1,3}	Odyssey ²	Poast Ultra ¹	Advance ² Bonanza ² Centurion Edge ^{2,3} Eptam ² Hoe-Grass 284 Liquid Achieve SC ¹	Odyssey ² Poast Ultra Pursuit ¹ Rival ² Select Treflan ²
	Established	Basagran ^{1,3} Glyphosate ^{1,2}	Reglone ¹	Odyssey ² Reglone ¹ Sencor ⁴	Kerb Poast Ultra ¹ Reglone ¹	Assure II ¹ Poast Ultra Odyssey ³	Pursuit ^{1,3} Reglone ¹ Yuma ³
Alsike Clover	Seedling	Basagran ^{1,3} Caliber 400 ¹ Clovitox Plus ¹ Cobutox 600 ¹	Embutox 625 ¹ Glyphosate ^{1,2} Topside ¹ Tropotox Plus ¹			Bonanza ² Hoe-Grass 284 ¹ Liquid Achieve SC ¹	Poast Ultra Treflan ²
	Established	Glyphosate ^{1,2}			Poast Ultra ¹	Poast Ultra	
Cicer Milk Vetch	Seedling	Glyphosate ^{1,2}				Bonanza ² Eptam ^{1,3}	Poast Ultra Treflan ²
	Established	Glyphosate ^{1,2}			Poast Ultra ¹	Poast Ultra	
Red Clover	Seedling	Basagran ^{1,3} Clovitox Plus ¹ Glyphosate ^{1,2}	Topside ¹ Tropotox Plus ¹	MCPA amine		Bonanza ² Hoe-Grass 284 Liquid Achieve SC ¹	Treflan ²
	Established	Glyphosate ^{1,2} Reglone ¹		MCPA amine Reglone ¹	Reglone ¹	Reglone ¹	
Sweet Clover	Seedling	Glyphosate ^{1,2}				Bonanza ² Eptam ^{1,2,3} Hoe-Grass 284 Liquid Achieve SC ¹	Poast Ultra Rival ² Treflan ²
	Established	Basagran ³ Glyphosate ^{1,2}			Poast Ultra ¹	Poast Ultra	
White Clover	Seedling	Caliber 400 ¹ Clovitox Plus ¹ Cobutox 600 ¹ Embutox 625 ¹	Glyphosate ^{1,2} Topside ¹ Tropotox Plus ¹			Liquid Achieve SC ¹	
	Established	Glyphosate ^{1,2}	Reglone ¹	Reglone ¹	Reglone ¹	Reglone ¹	
Bird's-foot Trefoil	Seedling	Caliber 400 ¹ Cobutox 600 ¹	Embutox 625 ¹ Glyphosate ^{1,2}			Bonanza ² Eptam ¹ Liquid Achieve SC ¹	Treflan ²
	Established	Glyphosate ^{1,2}	Reglone ¹	Reglone ¹	Kerb Reglone ¹	Reglone ¹	
Sainfoin	Seedling	Basagran ^{1,3}	Glyphosate ^{1,2}		Poast Ultra ¹	Bonanza ² Hoe-Grass 284 ¹ Liquid Achieve SC ¹	Poast Ultra Rival ² Treflan ²
	Established		Glyphosate ^{1,2}		Poast Ultra	Poast Ultra	

¹ Suppression only

² Pre-crop emergence herbicide

³ Used as a crop desiccant

⁴ Under irrigation only

⁵ Seed production only

⁶ Forage production only

⁷ Underseeding only

* Glyphosate-based chemicals are Credit, Factor, Glyfos, Maverick, Roundup Transorb HC, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Touchdown Total, Vantage Plus Max

Note: Roundup only used as a spot treatment on legumes

Check individual herbicides for grazing or feed restrictions

Herbicide Selector Chart – Forage Legumes

Crop	Crop Stage	Kochia	Lamb's-quarters	Leafy Spurge	Mustards
Alfalfa	Seedling	Bromotril ⁶ Brotex 240 ⁵ Edge ^{2,3} Koril ⁶ Odyssey ¹ Pardner ⁴	Advance ² Basagran ³ Bonanza ² Bromotril ⁶ Brotex 240 ⁵ Caliber 400 Clovitox Plus ⁵ Cobutox 600 Edge ^{2,3} Embutox 625	Eptam ² Koril ⁶ Odyssey ^{1,3} Pardner ⁴ Pursuit ¹ Rival ² Topside ⁵ Treflan ² Tropotox Plus ⁵	Amitrol 240 ⁶ Basagran ³ Bromotril ⁶ Brotex 240 ⁵ Caliber 400 Clovitox Plus ⁵ Cobutox 600 Embutox 625
	Established	Bromotril ⁶ Brotex 240 ⁵ Koril ⁶ Odyssey ^{1,3} Pardner ⁴ Reglone ³	Basagran ³ Bromotril ⁶ Brotex 240 ⁵ Koril ⁶ Odyssey ^{1,3}	Pardner ⁴ Princep ³ Reglone ³ Sencor ⁴	Amitrol 240 ⁶ Reglone ³ Basagran ³ Bromotril ⁶ Brotex 240 ⁵ Koril ⁶ Odyssey ⁵
Alsike Clover	Seedling		Basagran ³ Bonanza ² Caliber 400 Clovitox Plus Cobutox 600	Embutox 625 Topside Treflan ² Tropotox Plus	Amitrol 240 ⁶ Basagran ³ Caliber 400 Clovitox Plus Cobutox 600
	Established				Amitrol 240 ⁶
Cicer Milk Vetch	Seedling		Bonanza ² Eptam ^{1,3}	Treflan ²	
	Established				
Red Clover	Seedling	MCPA amine	Basagran ³ Bonanza ² Clovitox Plus MCPA amine	Topside Treflan ² Tropotox Plus	Amitrol 240 ⁶ Basagran ³ Clovitox Plus MCPA amine
	Established	MCPA amine Reglone ³	MCPA amine	Reglone ³	Amitrol 240 ⁶ Reglone ³ MCPA amine Reglone ³
Sweet Clover	Seedling		Bonanza ² Eptam ^{1,3}	Rival ² Treflan ²	Amitrol 240 ⁶
	Established		Basagran ³		Amitrol 240 ⁶ Basagran ³
White Clover	Seedling		Caliber 400 Clovitox Plus Cobutox 600	Embutox 625 Topside Tropotox Plus	Amitrol 240 ⁶ Caliber 400 Clovitox Plus Cobutox 600
	Established	Reglone ³	Reglone ³		Amitrol 240 ⁶ Reglone ³ Reglone ³
Bird's-foot Trefoil	Seedling		Bonanza ² Caliber 400 Cobutox 600	Embutox 625 Eptam ¹ Treflan ²	Amitrol 240 ⁶ Caliber 400 Cobutox 600
	Established	Reglone ³	Princep	Reglone ³	Amitrol 240 ⁶ Reglone ³ Reglone ³
Sainfoin	Seedling		Basagran ³ Bonanza ²	Rival ² Treflan ²	Amitrol 240 ⁶ Basagran ³
	Established				Amitrol 240 ⁶

¹ Suppression only

² Pre-crop emergence herbicide

³ Used as a crop desiccant

⁴ Under irrigation only

⁵ Seed production only

⁶ Forage production only

⁷ Underseeding only

* Glyphosate-based chemicals are Credit, Factor, Glyfos, Maverick, Roundup Transorb HC, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Touchdown Total, Vantage Plus Max

Note: Roundup only used as a spot treatment on legumes

Check individual herbicides for grazing or feed restrictions

For more detailed selector chart information, visit www.agriculture.alberta.ca/herbicide

Herbicide Selector Chart – Forage Legumes

Crop	Crop Stage	Narrow-leaved Hawk's-beard	Night-flowering Catchfly	Perennial Sow-thistle		Quack Grass	
Alfalfa	Seedling	Caliber 400 Cobutox 600 Embutox 625	Bromotril ⁵ Brotex 240 ⁵ Koril ⁵ Pardner ⁵	Amitrol 240 ⁶ Caliber 400 ¹ Clovitox Plus ^{1,5} Cobutox 600 ¹	Embutox 625 ¹ Glyphosate ^{6*} Topside ^{1,5} Tropotox Plus ^{1,5}	Amitrol 240 ⁶ Arrow 240 EC Centurion Eptam ^{1,2}	Glyphosate ^{6*} Poast Ultra ¹ Select
	Established	Reglone ³ Velpar ⁵	Bromotril ⁵ Brotex 240 ⁵ Koril ⁵ Pardner ⁵ Reglone ³ Sencor ⁴	Amitrol 240 ⁶ Clovitox Plus ¹ Glyphosate ^{6*}	Reglone ³ Tropotox Plus ¹ Topside ¹ Velpar ⁵	Amitrol 240 ⁶ Assure II ⁵ Glyphosate ^{6*} Kerb	Poast Ultra ¹ Reglone ³ Velpar ⁵ Yuma ⁵
Alsike Clover	Seedling	Caliber 400 Cobutox 600 Embutox 625		Amitrol 240 ⁶ Caliber 400 ¹ Clovitox Plus ¹ Cobutox 600 ¹	Embutox 625 ¹ Glyphosate ^{6*} Topside ¹ Tropotox Plus ¹	Amitrol 240 ⁶ Glyphosate ^{6*}	Poast Ultra ¹
	Established			Amitrol 240 ⁶	Glyphosate ^{6*}	Amitrol 240 ⁶ Glyphosate ^{6*}	Poast Ultra ¹
Cicer Milk Vetch	Seedling			Glyphosate ^{6*}		Glyphosate ^{6*}	Poast Ultra ¹
	Established			Glyphosate ^{6*}		Glyphosate ^{6*}	Poast Ultra ¹
Red Clover	Seedling			Amitrol 240 ⁶ Clovitox Plus ¹ Glyphosate ^{6*}	Topside ¹ Tropotox Plus ¹	Amitrol 240 ⁶ Glyphosate ^{6*}	
	Established	Reglone ³	Reglone ³	Amitrol 240 ⁶ Glyphosate ^{6*}	Reglone ³	Amitrol 240 ⁶ Glyphosate ^{6*}	Reglone ³
Sweet Clover	Seedling			Amitrol 240 ⁶	Glyphosate ^{6*}	Amitrol 240 ⁶ Eptam ^{1,2}	Glyphosate ^{6*} Poast Ultra ¹
	Established			Amitrol 240 ⁶	Glyphosate ^{6*}	Amitrol 240 ⁶ Glyphosate ^{6*}	Poast Ultra ¹
White Clover	Seedling	Caliber 400 Cobutox 600 Embutox 625		Amitrol 240 ⁶ Caliber 400 ¹ Clovitox Plus ¹ Cobutox 600 ¹	Embutox 625 ¹ Glyphosate ^{6*} Topside ¹ Tropotox Plus ¹	Amitrol 240 ⁶	Glyphosate ^{6*}
	Established	Reglone ³	Reglone ³	Amitrol 240 ⁶ Glyphosate ^{6*}	Reglone ³	Amitrol 240 ⁶ Glyphosate ^{6*}	Reglone ³
Bird's-foot Trefoil	Seedling	Caliber 400 Cobutox 600 Embutox 625		Caliber 400 ¹ Cobutox 600 ¹	Embutox 625 ¹ Glyphosate ^{6*}	Eptam ^{1,2} Glyphosate ^{6*}	
	Established	Reglone ³	Reglone ³	Glyphosate ^{6*}	Reglone ³	Kerb Glyphosate ^{6*}	Reglone ³
Sainfoin	Seedling			Glyphosate ^{6*}		Glyphosate ^{6*}	Poast Ultra ¹
	Established			Glyphosate ^{6*}		Glyphosate ^{6*}	Poast Ultra ¹

¹ Suppression or season long control

² Pre-crop emergence herbicide

³ Used as a crop desiccant

⁴ Under irrigation only

⁵ Seed production only

⁶ Forage production only

⁷ Underseeding only

* Glyphosate-based chemicals are Credit, Factor, Glyfos, Maverick, Roundup Transorb HC, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Touchdown Total, Vantage Plus Max

Note: Roundup only used as a spot treatment on legumes

Check individual herbicides for grazing or feed restrictions

For more detailed selector chart information, visit www.agriculture.alberta.ca/herbicide

Herbicide Selector Chart - Forage Legumes

Crop	Crop Stage	Redroot Pigweed		Scentless Chamomile (seedlings)	Shepherd's-purse (seedlings)		Stinkweed (seedlings)	
Alfalfa	Seedling	Advance ² Basagran ^{1,5} Bonanza ² Bromotril ⁶ Brotex 240 ⁵ Caliber 400 Clovitox Plus ⁵ Cobutox 600 Edge ^{2,5} Embutox 625	Eptam ² Koril ⁶ Odyssey ⁵ Pardner ⁵ Pursuit Rival ⁷ Topside ⁵ Treflan ² Tropotox Plus ⁵		Basagran ⁵ Caliber 400 Clovitox Plus ⁵ Cobutox 600 Embutox 625	Odyssey ⁵ Pursuit ¹ Topside ⁵ Tropotox Plus ⁵	Basagran ⁵ Bromotril ⁶ Brotex 240 ⁵ Caliber 400 Clovitox Plus ⁵ Cobutox 600 Embutox 625	Koril ⁶ Odyssey ⁵ Pardner ⁵ Pursuit Topside ⁵ Tropotox Plus ⁵
	Established	Basagran ^{1,5} Bromotril ⁶ Brotex 240 ⁵ Koril ⁶ Odyssey ⁵ Pardner ⁵	Pursuit ⁵ Reglone ³ Sencor ⁴	Reglone ³	Basagran ⁵ Odyssey ⁵	Reglone ³ Sencor ⁴	Basagran ⁵ Bromotril ⁶ Brotex 240 ⁵ Koril ⁶ Odyssey ⁵	Pardner ⁵ Pursuit ⁵ Reglone ³ Sencor ⁴
Alsike Clover	Seedling	Basagran ^{1,5} Bonanza ² Caliber 400 Clovitox Plus Cobutox 600	Embutox 625 Topside Treflan ² Tropotox Plus		Basagran ⁵ Caliber 400 Clovitox Plus Cobutox 600	Embutox 625 Topside Tropotox Plus	Basagran ⁵ Caliber 400 Clovitox Plus Cobutox 600	Embutox 625 Topside Tropotox Plus
	Established							
Cicer Milk Vetch	Seedling	Bonanza ² Eptam ^{2,5}	Treflan ²					
	Established							
Red Clover	Seedling	Basagran ^{1,5} Bonanza ² Clovitox Plus MCPA amine	Topside Treflan ² Tropotox Plus		Basagran ⁵ Clovitox Plus MCPA amine	Topside Tropotox Plus	Basagran ⁵ Clovitox Plus MCPA amine	Topside Tropotox Plus
	Established	MCPA amine Reglone ³		Reglone ³	MCPA amine Reglone ³		MCPA amine Reglone ³	
Sweet Clover	Seedling	Bonanza ² Eptam ^{2,5}	Rival ⁷ Treflan ²					
	Established	Basagran ^{1,5}			Basagran ⁵		Basagran ⁵	
White Clover	Seedling	Caliber 400 Clovitox Plus Cobutox 600	Embutox 625 Topside Tropotox Plus		Caliber 400 Clovitox Plus Cobutox 600	Embutox 625 Topside Tropotox Plus	Caliber 400 Clovitox Plus Cobutox 600	Embutox 625 Topside Tropotox Plus
	Established	Reglone ³		Reglone ³	Reglone ³		Reglone ³	
Bird's-foot Trefoil	Seedling	Bonanza ² Caliber 400 Cobutox 600	Embutox 625 Eptam ² Treflan ²		Caliber 400 Cobutox 600	Embutox 625	Caliber 400 Cobutox 600	Embutox 625
	Established	Reglone ³		Reglone ³	Reglone ³		Reglone ³	
Sainfoin	Seedling	Basagran ^{1,5} Bonanza ²	Rival ⁷ Treflan ²		Basagran ⁵		Basagran ⁵	
	Established							

¹ Suppression only

² Pre-crop emergence herbicide

³ Used as a crop desiccant

⁴ Under irrigation only

⁵ Seed production only

⁶ Forage production only

⁷ Underseeding only

* Glyphosate-based chemicals are Credit, Factor, Glyphos, Maverick, Roundup Transorb HC, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Touchdown Total, Vantage Plus Max

Note: Roundup only used as a spot treatment on legumes

Check individual herbicides for grazing or feed restrictions

Herbicide Selector Chart – Forage Legumes

Crop	Crop Stage	Tall Buttercup	Toadflax	Wild Buckwheat		Wild Oats	
Alfalfa	Seedling	Basagran Clovitox Plus ^{1,5} Topside ^{1,5} Tropotox Plus ^{1,5}	Amitrol 240 ⁶ Glyphosate ^{6*}	Advance ² Bonanza ² Bromotril ⁶ Brotex 240 ⁶ Caliber 400 Cobutox 600 Edge ^{2,5}	Embutox 625 Koril ⁶ Odyssey ⁵ Pardner ⁶ Rival ² Treflan ²	Advance ² Arrow 240 EC Avadex BW ^{2,7} Avenge ² Bonanza ² Centurion Edge ^{1,2,5} Eptam ² Hoe-Grass 284	Liquid Achieve SC ¹ MicroActiv ^{2,7} Odyssey ⁵ Poast Ultra Rival ² Select Treflan ²
	Established	Basagran	Amitrol 240 ⁶ Glyphosate ^{6*} Reglone ¹	Bromotril ⁶ Brotex 240 ⁶ Koril ⁶ Odyssey ⁵	Pardner ⁶ Princep Reglone ¹	Assure II ⁶ Kerb Odyssey ⁵ Poast Ultra	Princep Reglone ¹ Yuma ⁵
Alsike Clover	Seedling	Clovitox Plus ^{1,5} Topside ^{1,5} Tropotox Plus ^{1,5}	Amitrol 240 ⁶ Glyphosate ^{6*}	Bonanza ² Caliber 400 Cobutox 600	Embutox 625 Treflan ²	Assure II ⁶ Bonanza ² Avadex BW ^{2,7} Hoe-Grass 284 ⁵	Liquid Achieve SC ¹ MicroActiv ^{2,7} Poast Ultra Treflan ² Yuma ⁵
	Established		Amitrol 240 ⁶ Glyphosate ^{6*}			Poast Ultra	
Cicer Milk Vetch	Seedling		Glyphosate ^{6*}	Bonanza ²	Treflan ²	Eptam ^{2,5} Bonanza ²	Poast Ultra Treflan ²
	Established		Glyphosate ^{6*}			Poast Ultra	
Red Clover	Seedling	Clovitox Plus ^{1,5} MCPA amine Topside ^{1,5} Tropotox Plus ^{1,5}	Amitrol 240 ⁶ Glyphosate ^{6*}	Bonanza ²	Treflan ¹	Assure II ⁶ Avadex BW ^{2,7} Avenge ² Bonanza ² Hoe-Grass 284	Liquid Achieve SC ¹ MicroActiv ^{2,7} Treflan ² Yuma ⁵
	Established	MCPA amine	Amitrol 240 ⁶ Glyphosate ^{6*} Reglone ¹	Reglone ¹		Reglone ¹	
Sweet Clover	Seedling		Amitrol 240 ⁶ Glyphosate ^{6*}	Bonanza ² Rival ²	Treflan ²	Assure II ⁶ Avadex BW ^{2,7} Avenge ² Bonanza ² Eptam ^{2,5} Hoe-Grass 284	Liquid Achieve SC ¹ MicroActiv ^{2,7} Poast Ultra Rival ² Treflan ²
	Established		Amitrol 240 ⁶ Glyphosate ^{6*}			Poast Ultra	
White Clover	Seedling	Clovitox Plus ^{1,5} Topside ^{1,5} Tropotox Plus ^{1,5}	Amitrol 240 ⁶ Glyphosate ^{6*}	Caliber 400 Cobutox 600	Embutox 625	Assure II ⁶ Avadex BW ²	Liquid Achieve SC ¹ MicroActiv ^{2,7} Yuma ⁵
	Established		Amitrol 240 ⁶ Glyphosate ^{6*} Reglone ¹	Reglone ¹		Reglone ¹	
Bird's-foot Trefoil	Seedling		Glyphosate ^{6*}	Bonanza ² Caliber 400 Cobutox 600	Embutox 625 Treflan ²	Assure II ⁶ Avadex BW ^{2,7} Avenge ² Bonanza ² Eptam ²	Liquid Achieve SC ¹ MicroActiv ^{2,7} Treflan ² Yuma ⁵
	Established		Reglone ¹ Glyphosate ^{6*}	Princep Reglone ¹		Kerb Princep	Reglone ¹
Sainfoin	Seedling		Glyphosate ^{6*}	Bonanza ² Rival ²	Treflan ²	Assure II ⁶ Bonanza ² Hoe-Grass 284 ⁵ Liquid Achieve SC ¹	Poast Ultra Rival ² Treflan ² Yuma ⁵
	Established		Glyphosate ^{6*}			Poast Ultra	

¹ Suppression only

² Pre-crop emergence herbicide

³ Used as a crop desiccant

⁴ Under irrigation only

⁵ Seed production only

⁶ Forage production only

⁷ Underseeding only

* Glyphosate-based chemicals are Credit, Factor, Glyfos, Maverick, Roundup Transorb HC, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Touchdown Total, Vantage Plus Max

Note: Roundup only used as a spot treatment on legumes

Check individual herbicides for grazing or feed restrictions

For more detailed selector chart information, visit www.agriculture.alberta.ca/herbicide

Herbicide Selector Chart - Forage Grasses

Crop	Crop Stage	Annual Smartweed					Barnyard Grass
Meadow Bromegrass	Seedling	Attain, XC ¹ Deploy	MCPA ¹ Nimble	Prestige, XC ²	Refine SG	Spectrum ³	
	Established	Attain, XC ¹ Deploy	MCPA ¹ Nimble	Prestige, XC ² Refine SG	Spectrum ³ Sword ⁴	Target ⁵	
Smooth Bromegrass	Seedling	Badge ¹ Banvel II ¹ Basagran ¹ Bromotril ¹	Brotex 240 ¹ Buctril M ¹ Deploy 2,4-D	Hoe-Grass II ¹ Koril ¹ Logic M ¹ MCPA ¹	Mextrol ¹ Nimble Pardner ¹ Prestige, XC ²	Refine SG Spectrum ³ Sword ⁴ Target ⁵	Hoe-Grass II ¹
	Established	Deploy 2,4-D	MCPA ¹ Nimble	Prestige, XC ² Refine SG	Spectrum ³ Sword ⁴	Target ⁵	
Crested Wheatgrass	Seedling	Attain, XC ¹ Badge ¹ Banvel II ¹ Basagran ¹	Bromotril ¹ Brotex 240 ¹ Buctril M ¹ Deploy	2,4-D Hoe-Grass II ¹ Koril ¹ Logic M ¹	MCPA ¹ Mextrol ¹ Nimble Pardner ¹ Prestige, XC ²	Refine SG Spectrum ³ Sword ⁴ Target ⁵	Hoe-Grass II ¹
	Established	Accurate Aily Attain, XC ¹	Deploy 2,4-D MCPA ¹	Nimble Prestige, XC ²	Refine SG Spectrum ³	Sword ⁴ Target ⁵	
Intermediate Wheatgrass	Seedling	Attain, XC ¹ Badge ¹ Banvel II ¹ Bromotril ¹	Brotex 240 ¹ Buctril M ¹ Deploy 2,4-D	Hoe-Grass II ¹ Koril ¹ Logic M ¹ MCPA ¹	Pardner ¹ Prestige, XC ² Mextrol ¹ Nimble	Refine SG Spectrum ³ Sword ⁴ Target ⁵	Hoe-Grass II ¹
	Established	Accurate Aily Attain, XC ¹	Deploy 2,4-D MCPA ¹	Nimble Prestige, XC ²	Refine SG Spectrum ³	Sword ⁴ Target ⁵	
Creeping Red Fescue	Seedling	Badge ¹ Banvel II ¹ Basagran ¹ Bromotril ¹	Brotex 240 ¹ Buctril M ¹ Deploy 2,4-D	Hoe-Grass II ¹ Koril ¹ Logic M ¹ MCPA ¹	Mextrol ¹ Nimble Pardner ¹ Refine SG	Spectrum ³ Sword ⁴ Target ⁵	Hoe-Grass II ¹ Poast Ultra ⁵
	Established	Accurate Aily Attain, XC ¹	Banvel II Deploy 2,4-D	MCPA ¹ Nimble Prestige, XC ²	Refine SG Spectrum ³	Sword ⁴ Target ⁵	Assure II ⁵ Poast Ultra ⁵
Tall Fescue	Seedling	Attain, XC ¹ Badge ¹ Banvel II ¹	Buctril M ¹ Deploy 2,4-D	Logic M ¹ MCPA ¹	Mextrol ¹ Nimble	Refine SG Spectrum ³	
	Established	Attain, XC ¹ Deploy	2,4-D MCPA ¹	Prestige, XC ² Refine SG	Spectrum ³ Sword ⁴	Target ⁵	
Orchard Grass	Seedling	Badge ¹ Banvel II ¹ Basagran ¹ Bromotril ¹	Brotex 240 ¹ Buctril M ¹ Deploy 2,4-D	Koril ¹ Logic M ¹ MCPA ¹	Mextrol ¹ Nimble Pardner ¹	Refine SG Sword ⁴ Target ⁵	
	Established	Accurate Aily	Deploy 2,4-D	MCPA ¹ Nimble	Refine SG Sword ⁴	Target ⁵	
Timothy	Seedling	Attain, XC ¹ Badge ¹ Banvel II ¹ Basagran ¹	Bromotril ¹ Brotex 240 ¹ Buctril M ¹ Curtail M	2,4-D Logic M ¹ MCPA ¹	Mextrol ¹ Pardner ¹ Prestige, XC ²	Spectrum ³ Sword ⁴ Target ⁵	
	Established	Attain, XC ¹ Badge ¹ Buctril M	Curtail M 2,4-D Logic M	MCPA ¹ Mextrol	Prestige, XC ² Spectrum ³	Sword ⁴ Target ⁵	
Hay and Grazing	With Legumes	Caliber 400 ¹	Cobutox 600 ¹	Embutox 625 ¹			
	No Legumes	Banvel II + Mixes Caliber 400 ¹	Cobutox 600 ¹ 2,4-D	Embutox 625 ¹	MCPA ¹	Remedy	

- ¹ Suppression only
- ² Pre-plant incorporate treatment
- ³ Used as crop desiccant
- ⁴ Under irrigation only
- ⁵ Seed production only

- ⁶ Spot treatment only
- ⁷ Underseeding only
- ⁸ Forage production only
- ⁹ Glyphosate based chemicals are Credit, Factor, Glyfos, Maverick, Roundup Transorb HC, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Touchdown, Vantage Plus Max

Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Bluebur	Burdock
Meadow Brome grass	Seedling	Attain, XC ⁵	MCPA
	Established	Attain, XC ⁵	Attain, XC ⁵
Smooth Brome grass	Seedling	Attain, XC ⁵ Badge ³ Bromotril ⁶ Brotex 240 ⁵	Buctril M ¹ 2,4-D Koril ⁷ Logic M ⁸
	Established	Attain, XC ⁵ 2,4-D	MCPA Mextrol ² Pardner ⁴
Crested Wheatgrass	Seedling	Attain, XC ⁵ Badge ³ Bromotril ⁶ Brotex 240 ⁵	Buctril M ¹ 2,4-D Koril ⁷ Logic M ⁸
	Established	Accurate Ally Attain, XC ⁵	2,4-D MCPA
Intermediate Wheatgrass	Seedling	Attain, XC ⁵ Badge ³ Bromotril ⁶ Brotex 240 ⁵	Buctril M ¹ 2,4-D Koril ⁷ Logic M ⁸
	Established	Accurate Ally	Attain, XC ⁵ 2,4-D MCPA
Creeping Red Fescue	Seedling	Attain, XC ⁵ Badge ³ Bromotril ⁶ Brotex 240 ⁵	Buctril M ¹ 2,4-D Koril ⁷ Logic M ⁸
	Established	Accurate Ally	2,4-D MCPA
Tall Fescue	Seedling	Attain, XC ⁵ Badge ³ Bromotril ⁶ Brotex 240 ⁵	Buctril M ¹ 2,4-D Koril ⁷ Logic M ⁸
	Established	Accurate Ally	Attain, XC ⁵ 2,4-D MCPA
Orchard Grass	Seedling	Bromotril ⁶ Brotex 240 ⁵ Buctril M ¹	2,4-D Koril ⁷ Logic M ⁸
	Established	Attain, XC ⁵	2,4-D MCPA
Timothy	Seedling	Attain, XC ⁵ Badge ³ Bromotril ⁶ Brotex 240 ⁵	Buctril M ¹ 2,4-D Koril ⁷ Logic M ⁸
	Established	Attain, XC ⁵ Badge Buctril M	2,4-D Logic M MCPA Mextrol
Hay and Grazing	With Legumes		
	No Legumes	2,4-D	MCPA

¹ Suppression only

² Pre-plant incorporate treatment

³ Used as crop desiccant

⁴ Under irrigation only

⁵ Seed production only

⁶ Spot treatment only

⁷ Underseeding only

⁸ Forage production only

* Glyphosate-based chemicals are Credit, Factor, Glyfos, Maverick, Roundup Transorb HC, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Touchdown, Vantage Plus Max

Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Canada Thistle				
Meadow Bromegrass	Seeding	Attain, XC ^{1,5} Deploy ¹	Glyphosate ^{6*} Nimble ¹	Prestige, XC ³	Refine SG ¹	Spectrum ⁵
	Established	Attain, XC ^{1,5} Deploy ¹	Glyphosate ^{6*} Nimble ¹	Prestige, XC ³ Refine SG ¹	Spectrum ⁵ Sword ^{1,8}	Target ⁸
Smooth Bromegrass	Seeding	Attain, XC ^{1,5} Badge ^{1,5} Banvel II ¹ Basagran ^{1,5}	Buctril M ^{1,5} Deploy ¹ 2,4-D ¹ Glyphosate ^{6*}	Logic M ^{1,5} Lontrel MCPA ¹ Mextrol ^{1,5}	Nimble ¹ Prestige, XC ³ Refine SG ¹	Spectrum ⁵ Sword ^{1,8} Target ^{1,8}
	Established	Attain, XC ^{1,5} Deploy ¹ 2,4-D ¹	Glyphosate ^{6*} Lontrel MCPA ¹	Nimble ¹ Prestige, XC ³	Refine SG ¹ Spectrum ⁵	Sword ^{1,8} Target ^{1,8}
Crested Wheatgrass	Seeding	Attain, XC ^{1,5} Badge ^{1,5} Banvel II ^{1,5} Basagran ^{1,5}	Buctril M ^{1,5} Deploy ¹ 2,4-D ¹ Glyphosate ^{6*}	Logic M ^{1,5} Lontrel MCPA ¹ Mextrol ^{1,5}	Nimble ¹ Prestige, XC ³ Refine SG ¹	Spectrum ⁵ Sword ^{1,8} Target ^{1,8}
	Established	Accurate ¹ Ally ¹ Attain, XC ^{1,5}	Deploy ¹ 2,4-D ¹ Glyphosate ^{6*}	Lontrel MCPA ¹ Nimble ¹	Prestige, XC ³ Refine SG ¹ Spectrum ⁵	Sword ^{1,8} Target ^{1,8}
Intermediate Wheatgrass	Seeding	Attain, XC ^{1,5} Badge ^{1,5} Banvel II ¹ Buctril M ^{1,5}	Deploy ¹ 2,4-D ¹ Glyphosate ^{6*} Logic M ^{1,5}	Lontrel MCPA ¹ Mextrol ^{1,5}	Nimble ¹ Prestige, XC ³ Refine SG ¹	Spectrum ⁵ Sword ^{1,8} Target ^{1,8}
	Established	Accurate ¹ Ally ¹ Attain, XC ^{1,5}	Deploy ¹ 2,4-D ¹ Glyphosate ^{6*}	Lontrel MCPA ¹ Nimble ¹	Prestige, XC ³ Refine SG ¹ Spectrum ⁵	Sword ^{1,8} Target ^{1,8}
Creeping Red Fescue	Seeding	Attain, XC ^{1,5} Badge ^{1,5} Banvel II ¹ Basagran ^{1,5}	Buctril M ^{1,5} Deploy ¹ 2,4-D ¹ Glyphosate ^{6*}	Logic M ^{1,5} Lontrel MCPA ¹ Mextrol ^{1,5}	Nimble ¹ Prestige, XC ³ Refine SG ¹	Spectrum ⁵ Sword ^{1,8} Target ^{1,8}
	Established	Accurate ¹ Ally ¹ Attain, XC ^{1,5}	Banvel II ¹ Deploy ¹ 2,4-D ¹	Glyphosate ^{6*} Lontrel MCPA ¹	Nimble ¹ Prestige, XC ³ Refine SG ¹	Spectrum ⁵ Sword ^{1,8} Target ^{1,8}
Tall Fescue	Seeding	Attain, XC ^{1,5} Badge ^{1,5} Banvel II	Buctril M ^{1,5} Deploy ¹ 2,4-D ¹	Glyphosate ^{6*} Logic M ^{1,5} Lontrel	Mextrol ^{1,5} Nimble ¹	Refine SG ¹ Spectrum ⁵
	Established	Attain, XC ^{1,5} Deploy ¹ 2,4-D ¹	Glyphosate ^{6*} Lontrel	Nimble ¹ Prestige, XC ³	Refine SG ¹ Spectrum ⁵	Sword ^{1,8} Target ^{1,8}
Orchard Grass	Seeding	Badge ^{1,5} Banvel II ¹ Basagran ^{1,5}	Buctril M ^{1,5} Deploy ¹ 2,4-D ¹	Glyphosate ^{6*} Logic M ^{1,5} Lontrel	Mextrol ^{1,5} Nimble ¹ Refine SG ¹	Sword ^{1,8} Target ^{1,8}
	Established	Accurate ¹ Ally ¹	Deploy ¹ 2,4-D ¹	Glyphosate ^{6*} Lontrel	Nimble ¹ Refine SG ¹	Sword ^{1,8} Target ^{1,8}
Timothy	Seeding	Attain, XC ^{1,5} Badge ^{1,5} Banvel II ¹ Basagran ^{1,5}	Buctril M ^{1,5} Curtail M ¹ 2,4-D ¹ Glyphosate ^{6*}	Infinity ^{4,5} Logic M ^{1,5} Lontrel	MCPA ¹ Mextrol ^{1,5} Prestige, XC ³	Spectrum ⁵ Sword ^{1,8} Target ^{1,8}
	Established	Attain, XC ^{1,5} Badge ¹ Buctril M ¹	Curtail M ¹ 2,4-D ¹ Glyphosate ^{6*}	Logic M ¹ Lontrel MCPA ¹	Mextrol ¹ Prestige, XC ³ Spectrum ⁵	Sword ^{1,8} Target ^{1,8}
Hay and Grazing	With Legumes	Amdrol 240 ⁶ Caliber 400 ¹	Clovitox Plus ¹ Cobutox 600 ¹	Embutox 625 ¹	Topside ¹	Tropotox Plus ¹
	No Legumes	Amdrol 240 ⁶ Banvel II + Mixes ¹ Caliber 400 ¹	Clovitox Plus ¹ Cobutox 600 ¹ 2,4-D ¹	Escort ¹ Embutox 625 ¹ Grazon	Lontrel MCPA ¹ Topside ¹	Tropotox Plus ¹ Tordon 22K

¹ Suppression only

² Pre-plant incorporate treatment

³ Used as crop desiccant

⁴ Under irrigation only

⁵ Seed production only

⁶ Spot treatment only

⁷ Underseeding only

⁸ Forage production only

* Glyphosate-based chemicals are Credit, Factor, Glyfos, Maverick, Roundup Transorb HC, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Touchdown, Vantage Plus Max

Herbicide Selector Chart - Forage Grasses

Crop	Crop Stage	Cleavers			Clovers	Common Chickweed	
Meadow Brome	Seedling	Attain, XC ¹ Deploy ¹	Nimble ¹ Prestige, XC ¹	Refine SG ¹ Spectrum ⁵	Lontrel	Attain, XC ¹ Deploy Nimble	Prestige, XC ^{1,5} Refine SG Spectrum ⁵
	Established	Attain, XC ¹ Deploy ¹ Nimble ¹	Prestige, XC ¹ Refine SG ¹ Spectrum ⁵	Sword ² Target ³	Lontrel	Attain, XC ¹ Deploy Nimble	Prestige, XC ^{1,5} Refine SG Spectrum ⁵
Smooth Brome	Seedling	Attain, XC ¹ Banvel II Basagran ⁴ Deploy ¹	Nimble ¹ Prestige, XC ¹ Refine SG ¹	Spectrum ⁵ Sword ² Target ³	Lontrel	Attain, XC ¹ Basagran ⁴ Deploy Nimble	Prestige, XC ^{1,5} Refine SG Spectrum ⁵
	Established	Attain, XC ¹ Deploy ¹ Nimble ¹	Prestige, XC ¹ Refine SG ¹ Spectrum ⁵	Sword ² Target ³	Lontrel	Attain, XC ¹ Deploy Nimble	Prestige, XC ^{1,5} Refine SG Spectrum ⁵
Crested Wheatgrass	Seedling	Attain, XC ¹ Banvel II Basagran ⁴ Deploy ¹	Nimble ¹ Prestige, XC ¹ Refine SG ¹	Spectrum ⁵ Sword ² Target ³	Lontrel	Attain, XC ¹ Basagran ⁴ Deploy Nimble	Prestige, XC ^{1,5} Refine SG Spectrum ⁵
	Established	Attain, XC ¹ Deploy ¹ Nimble ¹	Prestige, XC ¹ Refine SG ¹	Spectrum ⁵ Target ³	Lontrel	Attain, XC ¹ Ally Deploy Nimble	Prestige, XC ^{1,5} Refine SG Spectrum ⁵
Intermediate Wheatgrass	Seedling	Attain, XC ¹ Banvel II Deploy ¹	Nimble ¹ Prestige, XC ¹ Refine SG ¹	Spectrum ⁵ Sword ² Target ³	Lontrel	Attain, XC ¹ Deploy Nimble	Prestige, XC ^{1,5} Refine SG Spectrum ⁵
	Established	Attain, XC ¹ Deploy ¹ Nimble ¹	Prestige, XC ¹ Refine SG ¹ Spectrum ⁵	Sword ² Target ³	Lontrel	Ally Attain, XC ¹ Deploy Nimble	Prestige, XC ^{1,5} Refine SG Spectrum ⁵
Creeping Red Fescue	Seedling	Attain, XC ¹ Banvel II ³ Basagran ⁴	Deploy ¹ Nimble ¹ Prestige, XC ¹ Refine SG ¹	Spectrum ⁵ Sword ² Target ³	Banvel II Lontrel	Attain, XC ¹ Basagran ⁴ Deploy Nimble	Prestige, XC ^{1,5} Refine SG Spectrum ⁵
	Established	Attain, XC ¹ Deploy ¹ Nimble ¹	Prestige, XC ¹ Refine SG ¹ Spectrum ⁵	Sword ² Target ³	Banvel II Lontrel	Ally Attain, XC ¹ Deploy Nimble	Prestige, XC ^{1,5} Refine SG Spectrum ⁵
Tall Fescue	Seedling	Attain, XC ¹ Banvel II + Mixes	Deploy ¹ Nimble ¹	Refine SG ¹ Spectrum ⁵	Lontrel	Attain, XC ¹ Deploy Nimble	Refine SG Spectrum ⁵
	Established	Attain, XC ¹ Deploy ¹ Nimble ¹	Prestige, XC ¹ Refine SG ¹ Spectrum ⁵	Sword ² Target ³	Lontrel	Attain, XC ¹ Deploy Nimble	Prestige, XC ^{1,5} Refine SG Spectrum ⁵
Orchard Grass	Seedling	Banvel II Basagran ⁴ Deploy ¹	Nimble ¹ Refine SG ¹	Sword ² Target ³	Lontrel	Basagran ⁴ Deploy	Nimble Refine SG
	Established	Deploy ¹ Nimble ¹	Refine Extra ¹ Sword ²	Target ³	Lontrel	Ally Deploy	Nimble Refine SG
Timothy	Seedling	Attain, XC ¹ Banvel II Basagran ⁴	Infinity ⁶ Prestige, XC ¹ Spectrum ⁵	Sword ² Target ³	Lontrel (Alsike only)	Attain, XC ¹ Basagran ⁴ Infinity ⁶	Prestige, XC ^{1,5} Spectrum ⁵
	Established	Attain, XC ¹ Prestige, XC ¹	Sword ² Spectrum ⁵	Target ³	Lontrel (Alsike only)	Attain, XC ¹ Prestige, XC ^{1,5}	Spectrum ⁵
Hay and Grazing	With Legumes					Kerb	
	No Legumes	Banvel II + Mixes			Banvel II + Mixes Grazon	Kerb	

¹ Suppression only

² Pre-plant incorporate treatment

³ Used as crop desiccant

⁴ Under irrigation only

⁵ Seed production only

⁶ Spot treatment only

⁷ Underseeding only

⁸ Forage production only

* Glyphosate-based chemicals are Credit, Factor, Glyfos, Maverick, Roundup Transorb HC, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Touchdown, Vantage Plus Max

Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Common Groundsel			Common Ragweed		
Meadow Brome	Seedling	Deploy Nimble	Prestige, XC ⁵ Refine SG		Attain, XC ⁵ MCPA		
	Established	Deploy Nimble	Prestige, XC ⁵ Refine SG		Attain, XC ⁵ MCPA	Sword ⁶	Target ⁴
Smooth Brome	Seedling	Badge ³ Basagran ⁵ Bromotril ³ Brotex 240 ⁵ Buctril M ³	Deploy Hoe-Grass II ³ Koril ³ Logic M ³ Lontrel	Mextrol ³ Nimble Pardner ³ Prestige, XC ⁵ Refine SG	Attain, XC ⁵ Badge ³ Buctril M ³	Logic M ³ MCPA Mextrol ³	Sword ⁶ Target ⁴
	Established	Deploy Lontrel	Nimble Prestige, XC ⁵	Refine SG	Attain, XC ⁵ MCPA	Sword ⁶	Target ⁴
Crested Wheatgrass	Seedling	Badge ³ Basagran ⁵ Bromotril ³ Brotex 240 ⁵ Buctril M ³	Deploy Hoe-Grass II ³ Koril ³ Logic M ³ Lontrel	Mextrol ³ Nimble Pardner ³ Prestige, XC ⁵ Refine SG	Attain, XC ⁵ Badge ³ Banvel II + Mixes ¹	Buctril M ³ Logic M ³ MCPA	Mextrol ³ Sword ⁶ Target ⁴
	Established	Accurate Ally Deploy	Lontrel Nimble	Prestige, XC ⁵ Refine SG	Attain, XC ⁵ MCPA	Sword ⁶	Target ⁴
Intermediate Wheatgrass	Seedling	Badge ³ Bromotril ³ Brotex 240 ⁵ Buctril M ³ Deploy	Hoe-Grass II ³ Koril ³ Logic M ³ Lontrel Mextrol ³	Nimble Pardner ³ Prestige, XC ⁵ Refine SG	Attain, XC ⁵ Badge ³ Buctril M ³	Logic M ³ Mextrol ³	Sword ⁶ Target ⁴
	Established	Accurate Ally Deploy	Lontrel Nimble	Prestige, XC ⁵ Refine SG	Attain, XC ⁵ MCPA	Sword ⁶	Target ⁴
Creeping Red Fescue	Seedling	Badge ³ Basagran ⁵ Bromotril ³ Brotex 240 ⁵ Buctril M ³	Deploy Hoe-Grass II ³ Koril ³ Logic M ³ Lontrel	Mextrol ³ Nimble Pardner ³ Prestige, XC ⁵ Refine SG	Attain, XC ⁵ Badge ³ Buctril M ³	Logic M ³ MCPA Mextrol ³	Sword ⁶ Target ⁴
	Established	Accurate Ally Basagran ⁵	Deploy Lontrel Nimble	Prestige, XC ⁵ Refine SG	Attain, XC ⁵ MCPA	Sword ⁶	Target ⁴
Tall Fescue	Seedling	Badge ³ Buctril M ³ Deploy	Logic M ³ Lontrel Mextrol ³	Nimble Refine SG	Attain, XC ⁵ Badge ³	Banvel II + Mixes Buctril M ³	Logic M ³ MCPA Mextrol ³
	Established	Deploy Lontrel	Nimble Prestige, XC ⁵	Refine SG	Attain, XC ⁵ MCPA	Sword ⁶	Target ⁴
Orchard Grass	Seedling	Badge ³ Basagran ⁵ Bromotril ³ Buctril M ³ Brotex 240 ⁵	Deploy Koril ³ Logic M ³ Lontrel	Mextrol ³ Nimble Pardner ³ Refine SG	Badge ³ Buctril M ³ Logic M ³	MCPA Mextrol ³	Sword ⁶ Target ⁴
	Established	Accurate Ally Basagran ⁵	Deploy Lontrel	Nimble Refine SG	MCPA	Sword ⁶	Target ⁴
Timothy	Seedling	Badge ³ Basagran ⁵ Bromotril ³ Buctril M ³	Brotex 240 ⁵ Curtail M ³ Koril ³ Logic M ³	Lontrel Mextrol ³ Pardner ³ Prestige, XC ⁵	Attain, XC ⁵ Badge ³ Banvel II Buctril M ³	Infinity ³ Logic M ³ MCPA	Mextrol ³ Sword ⁶ Target ⁴
	Established	Badge Basagran ⁵ Buctril M ³	Curtail M ³ Logic M ³ Lontrel	Mextrol Prestige, XC ⁵	Attain, XC ⁵ Badge Buctril M ³	Infinity ³ Logic M ³ Mextrol ³	MCPA Sword ⁶ Target ⁴
Hay and Grazing	With Legumes				Clovitox Plus	Topside	Tropotox Plus
	No Legumes	Lontrel			Clovitox Plus Grazon	MCPA Remedy	Topside Tropotox Plus

- ¹ Suppression only
² Pre-plant incorporate treatment
³ Used as crop desiccant
⁴ Under irrigation only
⁵ Seed production only

- ⁶ Spot treatment only
⁷ Underseeding only
⁸ Forage production only
^{*} Glyphosate-based chemicals are Credit, Factor, Glyfos, Maverick, Roundup Transorb HC, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Touchdown, Vantage Plus Max

Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Corn Spurry		Cow Cockle			
Meadow Brome	Seedling	Deploy Nimble	Refine SG	Deploy Nimble	Refine SG		
	Established	Deploy Nimble Refine SG	Sword ¹ Target ²	Deploy Nimble	Refine SG	Sword ¹	Target ²
Smooth Brome	Seedling	Banvel II Basagran ³ Deploy Nimble	Refine SG Sword ¹ Target ²	Badge ⁵ Banvel II Bromotril ⁶ Brotex 240 ⁷	Buctril M ⁸ Deploy Hoe-Grass II ⁹ Koril ¹⁰	Logic M ¹¹ Mextrol ¹² Nimble Pardner ¹³	Refine SG Sword ¹ Target ²
	Established	Deploy Nimble Refine SG	Sword ¹ Target ²	Deploy Nimble	Refine SG	Sword ¹	Target ²
Crested Wheatgrass	Seedling	Banvel II Basagran ³ Deploy Nimble	Refine SG Sword ¹ Target ²	Badge ⁵ Banvel II Bromotril ⁶ Brotex 240 ⁷	Buctril M ⁸ Deploy Hoe-Grass II ⁹ Koril ¹⁰	Logic M ¹¹ Mextrol ¹² Nimble Pardner ¹³	Refine SG Sword ¹ Target ²
	Established	Accurate Ally Deploy Nimble	Refine SG Sword ¹ Target ²	Accurate Ally	Deploy Nimble	Refine SG Sword ¹	Target ²
Intermediate Wheatgrass	Seedling	Banvel II Deploy Nimble	Refine SG Sword ¹ Target ²	Badge ⁵ Banvel II Bromotril ⁶ Brotex 240 ⁷	Buctril M ⁸ Deploy Hoe-Grass II ⁹ Koril ¹⁰	Logic M ¹¹ Mextrol ¹² Nimble Pardner ¹³	Refine SG Sword ¹ Target ²
	Established	Accurate Ally Deploy Nimble	Refine SG Sword ¹ Target ²	Accurate Ally	Deploy Nimble	Refine SG Sword ¹	Target ²
Creeping Red Fescue	Seedling	Banvel II ⁵ Basagran ³ Deploy Nimble	Refine SG Sword ¹ Target ²	Badge ⁵ Banvel II ⁵ Bromotril ⁶ Brotex 240 ⁷	Buctril M ⁸ Deploy Hoe-Grass II ⁹ Koril ¹⁰	Logic M ¹¹ Mextrol ¹² Nimble Pardner ¹³	Refine SG Sword ¹ Target ²
	Established	Accurate Ally Banvel II Deploy	Nimble Refine SG Sword ¹ Target ²	Accurate Ally Banvel II	Deploy Nimble	Refine SG Sword ¹	Target ²
Tall Fescue	Seedling	Banvel II Deploy	Nimble Refine SG	Badge ⁵ Banvel II	Buctril M ⁸ Deploy	Logic M ¹¹ Mextrol ¹²	Nimble Refine SG
	Established	Deploy Nimble Refine SG	Sword ¹ Target ²	Deploy Nimble	Refine SG	Sword ¹	Target ²
Orchard Grass	Seedling	Banvel II Basagran ³ Deploy Nimble	Refine SG Sword ¹ Target ²	Badge ⁵ Banvel II Bromotril ⁶ Brotex 240 ⁷	Buctril M ⁸ Deploy Koril ¹⁰ Logic M ¹¹	Mextrol ¹² Nimble Pardner ¹³	Refine SG Sword ¹ Target ²
	Established	Accurate Ally Deploy Nimble	Refine SG Sword ¹ Target ²	Accurate Ally	Deploy Nimble	Refine SG Sword ¹	Target ²
Timothy	Seedling	Banvel II Basagran ³	Sword ¹ Target ²	Badge ⁵ Banvel II Bromotril ⁶	Brotex 240 ⁷ Buctril M ⁸ Logic M ¹¹	Mextrol ¹² Pardner ¹³ Koril ¹⁰	Sword ¹ Target ²
	Established	Sword ¹	Target ²	Badge Buctril M	Logic M ¹¹ Mextrol	Sword ¹	Target ²
Hay and Grazing	With Legumes						
	No Legumes	Banvel II		Banvel II			

¹ Suppression only

² Pre-plant incorporate treatment

³ Used as crop desiccant

⁴ Under irrigation only

⁵ Seed production only

⁶ Spot treatment only

⁷ Underseeding only

⁸ Forage production only

⁹ Glyphosate-based chemicals are Credit, Factor, Glyphos, Maverick, Roundup Transorb HC, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Touchdown, Vantage Plus Max

Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Dandelion			Field Bindweed		
Meadow Brome grass	Seedling	Attain, XC ¹ MCPA ¹	Prestige, XC ²	Spectrum ³	Attain, XC ²	Glyphosate ^{4*}	
	Established	Attain, XC ² MCPA ¹	Prestige, XC ²	Spectrum ³	Attain, XC ² Glyphosate ^{4*}	Sword ^{1,5}	Target ^{1,6}
Smooth Brome grass	Seedling	Attain, XC ¹ 2,4-D ¹	MCPA ¹ Prestige, XC ²	Spectrum ³	Attain, XC ² Basagran ^{1,5} 2,4-D ¹	Glyphosate ^{4*} MCPA ¹	Sword ^{1,6} Target ^{1,6}
	Established	Attain, XC ² 2,4-D ¹	MCPA ¹ Prestige, XC ²	Spectrum ³	Attain, XC ² 2,4-D ¹	Glyphosate ^{4*}	MCPA ¹
Crested Wheatgrass	Seedling	Attain, XC ¹ 2,4-D ¹	MCPA ¹ Prestige, XC ²	Spectrum ³	Attain, XC ² Basagran ^{1,5} 2,4-D ¹	Glyphosate ^{4*} MCPA ¹	Sword ^{1,6} Target ^{1,6}
	Established	Attain, XC ² 2,4-D ¹	MCPA ¹ Prestige, XC ²	Spectrum ³	Attain, XC ² 2,4-D ¹	Glyphosate ^{4*}	MCPA ¹
Intermediate Wheatgrass	Seedling	Attain, XC ¹ 2,4-D ¹	MCPA ¹ Prestige, XC ²	Spectrum ³	Attain, XC ² 2,4-D ¹	Glyphosate ^{4*}	MCPA ¹
	Established	Attain, XC ² 2,4-D ¹	MCPA ¹ Prestige, XC ²	Spectrum ³	Attain, XC ² 2,4-D ¹	Glyphosate ^{4*} MCPA ¹	Sword ^{1,6} Target ^{1,6}
Creeping Red Fescue	Seedling	Attain, XC ¹ 2,4-D ¹	MCPA ¹ Prestige, XC ²	Spectrum ³	Attain, XC ² Basagran ^{1,5} 2,4-D ¹	Glyphosate ^{4*} MCPA ¹	Sword ^{1,6} Target ^{1,6}
	Established	Attain, XC ² Banvel II + Moxes ¹	2,4-D ¹ MCPA ¹	Prestige, XC ² Spectrum ³	Attain, XC ² 2,4-D ¹	Banvel II + Mixes ¹	Glyphosate ^{4*} MCPA ¹
Tall Fescue	Seedling	Attain, XC ¹ 2,4-D ¹	MCPA ¹	Spectrum ³	Attain, XC ² 2,4-D ¹	Glyphosate ^{4*}	MCPA ¹
	Established	Attain, XC ² 2,4-D ¹	MCPA ¹ Prestige, XC ²	Spectrum ³	Attain, XC ² 2,4-D ¹	Glyphosate ^{4*} MCPA ¹	Sword ^{1,6} Target ^{1,6}
Orchard Grass	Seedling	2,4-D ¹	MCPA ¹		Basagran ^{1,5} 2,4-D ¹	Glyphosate ^{4*} MCPA ¹	Sword ^{1,6} Target ^{1,6}
	Established	2,4-D ¹	MCPA ¹		2,4-D ¹ Glyphosate ^{4*}	MCPA ¹ Sword ^{1,6}	Target ^{1,6}
Timothy	Seedling	Attain, XC ¹ Curtail M	2,4-D ¹ MCPA ¹	Prestige, XC ² Spectrum ³	Attain, XC ² Basagran ^{1,5} 2,4-D ¹	Glyphosate ^{4*} MCPA ¹	Sword ^{1,6} Target ^{1,6}
	Established	Attain, XC ² Curtail M	2,4-D ¹ MCPA ¹	Prestige, XC ² Spectrum ³	Attain, XC ² 2,4-D ¹	Glyphosate ^{4*}	MCPA ¹
Hay and Grazing	With Legumes	Amirtol 240 ⁶ Caliber 400 ¹	Cobutox 600 ¹	Embutox 625 ¹	Caliber 400 ¹ Clovitox Plus ¹	Cobutox 600 ¹ Embutox 625 ¹	Topside ¹ Tropotox Plus ¹
	No Legumes	Amirtol 240 ⁶ Caliber 400 ¹ Cobutox 600 ¹	Embutox 625 ¹ Escort 2,4-D ¹	Grazon MCPA ¹ Remedy	Banvel II Caliber 400 ¹ Clovitox Plus ¹ Cobutox 600 ¹	2,4-D ¹ Embutox 625 ¹ MCPA ¹ Remedy	Topside ¹ Tordon 22K Tropotox Plus ¹

¹ Suppression only

² Pre-plant incorporate treatment

³ Used as crop desiccant

⁴ Under irrigation only

⁵ Seed production only

⁶ Spot treatment only

⁷ Underseeding only

⁸ Forage production only

* Glyphosate-based chemicals are Credit, Factor, Glyfos, Maverick, Roundup Transorb HC, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Touchdown, Vantage Plus Max

Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Flixweed (seedlings)				Green Foxtail
Meadow Bromegrass	Seedling	Attain, XC ¹ Deploy	MCPA Nimble	Prestige, XC ¹ Refine SG	Spectrum ²	
	Established	Attain, XC ¹ Deploy MCPA	Nimble Prestige, XC ¹	Refine SG Spectrum ²	Sword ³ Target ⁴	
Smooth Bromegrass	Seedling	Attain, XC ¹ Badge ⁵ Banvel II + Mixes Buctril M ⁶	Deploy 2,4-D Logic M ⁷ MCPA	Mextrol ⁸ Nimble Prestige, XC ¹ Refine SG	Spectrum ² Sword ³ Target ⁴	Hoe-Grass II ⁹
	Established	Attain, XC ¹ Deploy 2,4-D	MCPA Nimble Prestige, XC ¹	Refine SG Spectrum ²	Sword ³ Target ⁴	Liquid Achieve SC ¹⁰
Crested Wheatgrass	Seedling	Attain, XC ¹ Badge ⁵ Banvel II + Mixes Buctril M ⁶	Deploy 2,4-D Logic M ⁷ MCPA	Mextrol ⁸ Nimble Prestige, XC ¹ Refine SG	Spectrum ² Sword ³ Target ⁴	Hoe-Grass II ⁹
	Established	Ally Attain, XC ¹ Deploy	2,4-D MCPA Nimble	Prestige, XC ¹ Refine SG Spectrum ²	Sword ³ Target ⁴	Liquid Achieve SC
Intermediate Wheatgrass	Seedling	Attain, XC ¹ Badge ⁵ Banvel II + Mixes Buctril M ⁶	Deploy 2,4-D Logic M ⁷ MCPA	Mextrol ⁸ Nimble Prestige, XC ¹ Refine SG	Spectrum ² Sword ³ Target ⁴	Hoe-Grass II ⁹
	Established	Ally Attain, XC ¹ Deploy	2,4-D MCPA Nimble	Prestige, XC ¹ Refine SG Spectrum ²	Sword ³ Target ⁴	
Creeping Red Fescue	Seedling	Attain, XC ¹ Badge ⁵ Banvel II + Mixes Buctril M ⁶	Deploy 2,4-D Logic M ⁷ MCPA	Mextrol ⁸ Nimble Prestige, XC ¹ Refine SG	Spectrum ² Sword ³ Target ⁴	Hoe-Grass II ⁹ Poast Ultra ¹¹
	Established	Ally Attain, XC ¹ Banvel II + Mixes	Deploy 2,4-D MCPA	Nimble Prestige, XC ¹ Refine SG	Spectrum ² Sword ³ Target ⁴	Assure II ¹² Poast Ultra ¹¹
Tall Fescue	Seedling	Attain, XC ¹ Badge ⁵ Banvel II + Mixes	Buctril M ⁶ Deploy 2,4-D	Logic M ⁷ MCPA Mextrol ⁸	Nimble Refine SG Spectrum ²	
	Established	Attain, XC ¹ Deploy 2,4-D	MCPA Nimble Prestige, XC ¹	Refine SG Spectrum ²	Sword ³ Target ⁴	
Orchard Grass	Seedling	Badge ⁵ Banvel II + Mixes Buctril M ⁶	Deploy 2,4-D Logic M ⁷	MCPA Mextrol ⁸ Nimble	Refine SG Sword ³ Target ⁴	
	Established	Ally Deploy	2,4-D MCPA	Nimble Refine SG	Sword ³ Target ⁴	
Timothy	Seedling	Attain, XC ¹ Badge ⁵ Banvel II + Mixes Curtail M	Buctril M ⁶ 2,4-D Infinity ¹³ Logic M ⁷	MCPA Mextrol ⁸ Prestige, XC ¹	Spectrum ² Sword ³ Target ⁴	
	Established	Attain, XC ¹ Badge Buctril M	Curtail M 2,4-D Logic M ⁷	MCPA Mextrol ⁸ Prestige, XC ¹	Spectrum ² Sword ³ Target ⁴	
Hay and Grazing	With Legumes					
	No Legumes	2,4-D	MCPA			

¹ Suppression only

² Pre-plant incorporate treatment

³ Used as crop desiccant

⁴ Under irrigation only

⁵ Seed production only

⁶ Spot treatment only

⁷ Underseeding only

⁸ Forage production only

⁹ Glyphosate-based chemicals are Credit, Factor, Glyfos, Maverick, Roundup Transorb HC, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Touchdown, Vantage Plus Max

Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Hemp-nettle			Kochia			
Meadow Bromegrass	Seedling	Attain, XC ^{1,5} Deploy MCPA ¹	Nimble Prestige, XC ^{1,5}	Refine SG Spectrum ⁵	Attain, XC ² Deploy ⁷	MCPA Nimble ⁷	Prestige, XC ³	Refine SG ³
	Established	Attain, XC ^{1,5} Deploy MCPA ¹	Nimble Prestige, XC ^{1,5} Refine SG	Spectrum ⁵ Sword ⁶ Target ⁶	Attain, XC ² Deploy ⁷	MCPA Nimble ⁷	Prestige, XC ³ Refine SG ⁷	Sword ⁶ Target ⁶
Smooth Bromegrass	Seedling	Attain, XC ^{1,5} Banvel II Deploy MCPA ¹	Nimble Prestige, XC ^{1,5} Refine SG	Spectrum ⁵ Sword ⁶ Target ⁶	Attain, XC ² Badge ⁵ Banvel II + Mixes Bromotril ⁶ Brotex 240 ⁵	Buctril M ⁶ Deploy ⁷ 2,4-D Hoe-Grass II ⁶ Koril ⁶	Logic M ⁶ Mextrol ⁶ Nimble ⁷ Pardner ⁵ Prestige, XC ³	Refine SG ³ Sword ⁶ Target ⁶ MCPA
	Established	Attain, XC ^{1,5} Deploy MCPA ¹	Nimble Prestige, XC ^{1,5} Refine SG	Spectrum ⁵ Sword ⁶ Target ⁶	Attain, XC ² Deploy ⁷ 2,4-D	MCPA Nimble ⁷	Prestige, XC ³ Refine SG ⁷	Sword ⁶ Target ⁶
Crested Wheatgrass	Seedling	Attain, XC ^{1,5} Banvel II Deploy MCPA ¹	Nimble Prestige, XC ^{1,5} Refine SG	Spectrum ⁵ Sword ⁶ Target ⁶	Attain, XC ² Badge ⁵ Banvel II + Mixes Bromotril ⁶ Brotex 240 ⁵	Buctril M ⁶ Deploy ⁷ 2,4-D Hoe-Grass II ⁶ Logic M ⁶	Koril ⁶ MCPA Mextrol ⁶ Nimble ⁷ Pardner ⁵	Prestige, XC ³ Refine SG ³ Sword ⁶ Target ⁶
	Established	Accurate Ally Attain, XC ^{1,5} Deploy	MCPA ¹ Nimble Prestige, XC ^{1,5} Refine SG	Spectrum ⁵ Sword ⁶ Target ⁶	Accurate ¹ Ally ¹ Attain, XC ²	Deploy ⁷ 2,4-D MCPA	Nimble ⁷ Prestige, XC ³ Refine SG ⁷	Sword ⁶ Target ⁶
Intermediate Wheatgrass	Seedling	Attain, XC ^{1,5} Banvel II Deploy MCPA ¹	Nimble Prestige, XC ^{1,5} Refine SG	Spectrum ⁵ Sword ⁶ Target ⁶	Attain, XC ² Badge ⁵ Banvel II Bromotril ⁶ Brotex 240	Buctril M ⁶ Deploy ⁷ 2,4-D Hoe-Grass II ⁶ Logic M ⁶	Koril ⁶ MCPA Mextrol ⁶ Nimble ⁷ Pardner ⁵	Prestige, XC ³ Refine SG ³ Sword ⁶ Target ⁶
	Established	Accurate Ally Attain, XC ^{1,5} Deploy	MCPA ¹ Nimble Prestige, XC ^{1,5} Refine SG	Spectrum ⁵ Sword ⁶ Target ⁶	Accurate ¹ Ally ¹ Attain, XC ²	Deploy ⁷ 2,4-D MCPA	Nimble ⁷ Prestige, XC ³ Refine SG ⁷	Sword ⁶ Target ⁶
Creeping Red Fescue	Seedling	Attain, XC ^{1,5} Banvel II Deploy MCPA ¹	Nimble Prestige, XC ^{1,5} Refine SG	Spectrum ⁵ Sword ⁶ Target ⁶	Attain, XC ² Badge ⁵ Banvel II Bromotril ⁶ Brotex 240 ⁵	Buctril M ⁶ Deploy ⁷ 2,4-D Hoe-Grass II ⁶ Logic M ⁶	Koril ⁶ MCPA Mextrol ⁶ Nimble ⁷ Pardner ⁵	Prestige, XC ³ Refine SG ³ Sword ⁶ Target ⁶
	Established	Accurate Ally Attain, XC ^{1,5} Deploy	MCPA ¹ Nimble Prestige, XC ^{1,5} Refine SG	Spectrum ⁵ Sword ⁶ Target ⁶	Accurate ¹ Ally ¹ Attain, XC ² Banvel II	Deploy ⁷ 2,4-D MCPA	Nimble ⁷ Prestige, XC ³ Refine SG ⁷	Sword ⁶ Target ⁶
Tall Fescue	Seedling	Attain, XC ^{1,5} Banvel II Deploy	MCPA ¹ Nimble	Refine SG Spectrum ⁵	Attain, XC ² Badge ⁵ Banvel II	Buctril M ⁶ Deploy ⁷ 2,4-D	Logic M ⁶ MCPA Mextrol ⁶	Nimble ⁷ Refine SG ⁷
	Established	Attain, XC ^{1,5} Deploy MCPA ¹	Nimble Prestige, XC ^{1,5} Refine SG	Spectrum ⁵ Sword ⁶ Target ⁶	Attain, XC ² Deploy ⁷ 2,4-D	MCPA Nimble ⁷	Prestige, XC ³ Refine SG ⁷	Sword ⁶ Target ⁶
Orchard Grass	Seedling	Banvel II Deploy MCPA ¹	Nimble Refine SG	Sword ⁶ Target ⁶	Badge ⁵ Banvel II Bromotril ⁶ Brotex 240 ⁵	Buctril M ⁶ Deploy ⁷ 2,4-D Koril ⁶	Logic M ⁶ MCPA Mextrol ⁶ Nimble ⁷	Pardner ⁵ Refine SG ⁷ Sword ⁶ Target ⁶
	Established	Ally Deploy MCPA ¹	Nimble Refine SG	Sword ⁶ Target ⁶	Ally ¹ Deploy ⁷	2,4-D MCPA	Nimble ⁷ Refine SG ⁷	Sword ⁶ Target ⁶
Timothy	Seedling	Attain, XC ^{1,5} Banvel II Infinity ⁵	MCPA ¹ Prestige, XC ^{1,5} Spectrum ⁵	Sword ⁶ Target ⁶	Attain, XC ² Badge ⁵ Banvel II Brotex 240 ⁵	Buctril M ⁶ Curtail M ⁶ 2,4-D Infinity ⁵	Koril ⁶ Logic M ⁶ Mextrol ⁶	Prestige, XC ³ Sword ⁶ Target ⁶
	Established	Attain, XC ^{1,5} MCPA ¹	Prestige, XC ^{1,5} Spectrum ⁵	Sword ⁶ Target ⁶	Attain, XC ² Badge Buctril M	Curtail M ⁶ 2,4-D Logic M ⁶	MCPA Mextrol Prestige, XC ³	Sword ⁶ Target ⁶
Hay and Grazing	With Legumes	Clovitox Plus ¹	Topside ¹	Tropotox Plus ¹				
	No Legumes	Clovitox Plus ¹ MCPA ¹	Topside ¹	Tropotox Plus ¹	2,4-D	Escort	MCPA	

¹ Suppression only

² Pre-plant incorporate treatment

³ Used as crop desiccant

⁴ Under irrigation only

⁵ Seed production only

⁶ Spot treatment only

⁷ Underseeding only

⁸ Forage production only

^{*} Glyphosate-based chemicals are Credit, Factor, Glyfos, Maverick, Roundup Transorb HC, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Touchdown, Vantage Plus Max

[†] 90% of kochia-surveyed fields have resistance to Group 2 herbicides such as these products. Use herbicides from another herbicide group to control kochia.

Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Lamb's-quarters				
Meadow Bromegrass	Seedling	Attain, XC ¹ Deploy	MCPA Nimble	Prestige, XC ¹ Refine SG	Refine SG	Spectrum ³
	Established	Attain, XC ¹ Deploy	MCPA Nimble	Prestige, XC ¹ Refine SG	Spectrum ³ Sword ⁴	Target ⁴
Smooth Bromegrass	Seedling	Attain, XC ¹ Badge ⁵ Basagran ⁶ Bromotril ⁶	Brotex 240 ⁵ Buctril M ⁶ Deploy 2,4-D	Hoe-Grass II ⁷ Logic M ⁸ MCPA Mextrol ⁹	Nimble Pardner ⁹ Prestige, XC ¹ Refine SG	Spectrum ³ Sword ⁴ Target ⁴
	Established	Attain, XC ¹ Deploy	2,4-D MCPA	Nimble Prestige, XC ¹	Refine SG Spectrum ³	Sword ⁴ Target ⁴
Crested Wheatgrass	Seedling	Attain, XC ¹ Badge ⁵ Basagran ⁶ Bromotril ⁶	Brotex 240 ⁵ Buctril M ⁶ Deploy 2,4-D	Hoe-Grass II ⁷ Koril ⁸ Logic M ⁸ MCPA	Mextrol ⁹ Nimble Pardner ⁹ Prestige, XC ¹	Refine SG Spectrum ³ Sword ⁴ Target ⁴
	Established	Accurate Ally ¹ Attain, XC ¹	Deploy 2,4-D MCPA	Nimble Prestige, XC ¹	Refine SG Spectrum ³	Sword ⁴ Target ⁴
Intermediate Wheatgrass	Seedling	Attain, XC ¹ Badge ⁵ Bromotril ⁶ Brotex 240 ⁵	Buctril M ⁶ Deploy 2,4-D Hoe-Grass II ⁷	Koril ⁸ Logic M ⁸ MCPA Mextrol ⁹	Nimble Pardner ⁹ Prestige, XC ¹ Refine SG	Spectrum ³ Sword ⁴ Target ⁴
	Established	Accurate Ally ¹ Attain, XC ¹	Deploy 2,4-D MCPA	Nimble Prestige, XC ¹	Refine SG Spectrum ³	Sword ⁴ Target ⁴
Creeping Red Fescue	Seedling	Attain, XC ¹ Badge ⁵ Basagran ⁶ Bromotril ⁶	Brotex 240 ⁵ Buctril M ⁶ Deploy 2,4-D	Hoe-Grass II ⁷ Koril ⁸ Logic M ⁸ MCPA	Mextrol ⁹ Nimble Prestige, XC ¹ Refine SG	Spectrum ³ Sword ⁴ Target ⁴ Pardner ⁹
	Established	Accurate ¹ Ally ¹ Attain, XC ¹	Banvel II 2,4-D Deploy	MCPA Nimble Prestige, XC ¹	Refine SG Spectrum ³	Sword ⁴ Target ⁴
Tall Fescue	Seedling	Attain, XC ¹ Badge ⁵ Banvel II + Mixes	Buctril M ⁶ Deploy 2,4-D	Logic M ⁸ MCPA	Mextrol ⁹ Nimble	Refine SG Spectrum ³
	Established	Attain, XC ¹ Deploy	2,4-D MCPA	Nimble Prestige, XC ¹	Refine SG Spectrum ³	Sword ⁴ Target ⁴
Orchard Grass	Seedling	Badge ⁵ Basagran ⁶ Bromotril ⁶ Brotex 240 ⁵	Buctril M ⁶ Deploy 2,4-D	Koril ⁸ Logic M ⁸ MCPA	Mextrol ⁹ Nimble Pardner ⁹	Refine SG Sword ⁴ Target ⁴
	Established	Accurate ¹ Ally ¹	Deploy 2,4-D	MCPA Nimble	Refine SG Sword ⁴	Target ⁴
Timothy	Seedling	Attain, XC ¹ Badge ⁵ Banvel II + Mixes Basagran ⁶	Bromotril ⁶ Brotex 240 ⁵ Buctril M ⁶ Curtail M	2,4-D Infinity ¹⁰ Koril ⁸ Logic M ⁸	MCPA Mextrol ⁹ Pardner ⁹ Prestige, XC ¹	Spectrum ³ Sword ⁴ Target ⁴
	Established	Attain, XC ¹ Badge Buctril M	2,4-D Curtail M Logic M	MCPA Mextrol	Prestige, XC ¹ Spectrum ³	Sword ⁴ Target ⁴
Hay and Grazing	With Legumes	Caliber 400 Clovitox Plus	Cobutox 600	Embutox 625	Topside	Tropotox Plus
	No Legumes	Caliber 400 Clovitox Plus	Cobutox 600 2,4-D	Embutox 625 MCPA	Remedy Topside	Tropotox Plus

¹ Suppression only

² Pre-plant incorporate treatment

³ Used as crop desiccant

⁴ Under irrigation only

⁵ Seed production only

⁶ Spot treatment only

⁷ Underseeding only

⁸ Forage production only

⁹ Glyphosate-based chemicals are Credit, Factor, Glyphos, Maverick, Roundup Transorb HC, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Touchdown, Vantage Plus Max.

Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Leafy Spurge	Mustards				
Meadow Brome grass	Seedling	Attain, XC ¹ 2,4-D ¹ MCPA ¹	Attain, XC ¹	MCPA	Spectrum ¹		
	Established	Attain, XC ¹ MCPA ¹	Attain, XC ¹	MCPA	Spectrum ¹	Sword ¹	Target ¹
Smooth Brome grass	Seedling	Attain, XC ¹ 2,4-D ¹ MCPA ¹	Attain, XC ¹ Badge ¹ Banvel II Basagran ¹	Bromotril ¹ Brotex 240 ¹ Buctril M ¹ 2,4-D	Hoe-Grass II ¹ Koril ¹ Logic M ¹	MCPA Mextrol ¹ Pardner ¹	Spectrum ¹ Sword ¹ Target ¹
	Established	Attain, XC ¹ 2,4-D ¹ MCPA ¹	Attain, XC ¹ 2,4-D	MCPA	Spectrum ¹	Sword ¹	Target ¹
Crested Wheatgrass	Seedling	Attain, XC ¹ 2,4-D1 MCPA ¹	Attain, XC ¹ Badge ¹ Banvel II	Basagran ¹ Bromotril ¹ Brotex 240 ¹ Buctril M ¹	2,4-D Hoe-Grass II Koril ¹ Logic M ¹	MCPA Mextrol ¹ Pardner ¹	Spectrum ¹ Sword ¹ Target ¹
	Established	Attain, XC ¹ 2,4-D ¹ MCPA ¹	Accurate Ally	Attain, XC ¹ 2,4-D	MCPA Spectrum ¹	Sword ¹	Target ¹
Intermediate Wheatgrass	Seedling	Attain, XC ¹ 2,4-D ¹ MCPA ¹	Attain, XC ¹ Badge ¹ Banvel II Bromotril ¹	Brotex 240 ¹ Buctril M ¹ 2,4-D	Hoe-Grass II ¹ Koril ¹ Logic M ¹	MCPA Mextrol ¹ Pardner ¹	Spectrum ¹ Sword ¹ Target ¹
	Established	Attain, XC ¹ 2,4-D ¹ MCPA ¹	Accurate Ally	Attain, XC ¹ MCPA	Spectrum ¹	Sword ¹	Target ¹
Creeping Red Fescue	Seedling	Attain, XC ¹ 2,4-D ¹ MCPA ¹	Attain, XC ¹ Badge ¹ Banvel II Basagran ¹	Bromotril ¹ Brotex 240 ¹ Buctril M ¹ 2,4-D	Hoe-Grass II ¹ Koril ¹ Logic M ¹	MCPA Mextrol ¹ Pardner ¹	Spectrum ¹ Sword ¹ Target ¹
	Established	Attain, XC ¹ 2,4-D ¹ MCPA ¹	Accurate Ally Attain, XC ¹	Banvel II + Mixes	2,4-D MCPA	Spectrum ¹ Sword ¹	Target ¹
Tall Fescue	Seedling	Attain, XC ¹ 2,4-D ¹ MCPA ¹	Attain, XC ¹	Banvel II + Mixes	Buctril M ¹ 2,4-D	Logic M ¹ MCPA	Spectrum ¹
	Established	Attain, XC ¹ 2,4-D ¹ MCPA ¹	Attain, XC ¹ 2,4-D	MCPA	Spectrum ¹	Sword ¹	Target ¹
Orchard Grass	Seedling	2,4-D ¹ MCPA ¹	Badge ¹ Banvel II Basagran ¹	Bromotril ¹ Brotex 240 ¹ Buctril M ¹	2,4-D Koril ¹ Logic M ¹	Mextrol ¹ MCPA Pardner ¹	Sword ¹ Target ¹
	Established	2,4-D ¹ MCPA ¹	Accurate Ally	2,4-D	MCPA	Sword ¹	Target ¹
Timothy	Seedling	Attain, XC ¹ 2,4-D ¹ MCPA ¹	Attain, XC ¹ Badge ¹ Banvel II Basagran ¹	Bromotril ¹ Brotex 240 ¹ Buctril M ¹ Curtail M	2,4-D Infinity ¹ Koril ¹ Logic M ¹	MCPA Mextrol ¹ Pardner ¹	Spectrum ¹ Sword ¹ Target ¹
	Established	Attain, XC ¹ 2,4-D ¹ MCPA ¹	Attain, XC ¹ Badge ¹ Buctril M	Curtail M 2,4-D	Logic M MCPA	Mextrol ¹ Spectrum ¹	Sword ¹ Target ¹
Hay and Grazing	With Legumes	Amitrol 240 ¹	Caliber 400 Clovitox Plus	Cobutox 600	Embutox 625	Topside	Tropotox Plus
	No Legumes	Amitrol 240 ¹ 2,4-D ¹ MCPA ¹ Tordon 22K	Banvel II Caliber 400	Clovitox Plus Cobutox 600	Embutox 625 2,4-D	MCPA Topside	Tropotox Plus

- ¹ Suppression only
- ² Pre-plant incorporate treatment
- ³ Used as crop desiccant
- ⁴ Under irrigation only
- ⁵ Seed production only

- ⁶ Spot treatment only
- ⁷ Underseeding only
- ⁸ Forage production only
- * Glyphosate based chemicals are Credit, Factor, Glyfos, Mavenick, Roundup Transorb HC, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Touchdown, Vantage Plus Max

For more detailed selector chart information, visit www.agriculture.alberta.ca/herbicide

Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Narrow-leaved Hawk's-beard		Night-flowering Catchfly			
Meadow Bromegrass	Seedling	Deploy Nimble	Refine SG				
	Established	Deploy Nimble	Refine SG	Sword ⁸	Target ⁴		
Smooth Bromegrass	Seedling	Deploy 2,4-D ¹	Nimble Refine SG	Badge ⁵ Bromotril ⁵ Brotex 240 ⁵	Buctril M ⁵ Hoe-Grass II ⁵ Koril ⁶	Logic M ⁵ Mextrol ⁵ Pardner ⁵	Sword ⁸ Target ⁴
	Established	Deploy 2,4-D ¹	Nimble Refine SG	Sword ⁸		Target ⁴	
Crested Wheatgrass	Seedling	Deploy 2,4-D ¹	Nimble Refine SG	Badge ⁵ Bromotril ⁵ Brotex 240 ⁵	Buctril M ⁵ Hoe-Grass II ⁵ Koril ⁶	Logic M ⁵ Mextrol ⁵ Pardner ⁵	Sword ⁸ Target ⁴
	Established	Accurate Ally Deploy	2,4-D ¹ Nimble Refine SG	Sword ⁸	Target ⁴		
Intermediate Wheatgrass	Seedling	Deploy 2,4-D ¹	Nimble Refine SG	Badge ⁵ Bromotril ⁵ Brotex 240 ⁵	Buctril M ⁵ Hoe-Grass II ⁵ Koril ⁶	Logic M ⁵ Mextrol ⁵ Pardner ⁵	Sword ⁸ Target ⁴
	Established	Accurate Ally Deploy	2,4-D ¹ Nimble Refine SG	Sword ⁸	Target ⁴		
Creeping Red Fescue	Seedling	Deploy 2,4-D ¹	Nimble Refine SG	Badge ⁵ Bromotril ⁵ Brotex 240 ⁵	Buctril M ⁵ Hoe-Grass II ⁵ Koril ⁶	Logic M ⁵ Mextrol ⁵ Pardner ⁵	Sword ⁸ Target ⁴
	Established	Accurate Ally Deploy	2,4-D ¹ Nimble Refine SG	Sword ⁸	Target ⁴		
Tall Fescue	Seedling	Deploy 2,4-D ¹	Nimble Refine SG	Badge ⁵	Buctril M ⁵	Logic M ⁵	Mextrol ⁵
	Established	Deploy 2,4-D ¹	Nimble Refine SG	Sword ⁸	Target ⁴		
Orchard Grass	Seedling	Deploy 2,4-D ¹	Nimble Refine SG	Badge ⁵ Bromotril ⁵ Brotex 240 ⁵	Buctril M ⁵ Koril ⁶ Logic M ⁵	Mextrol ⁵ Pardner ⁵	Sword ⁸ Target ⁴
	Established	Accurate Ally Deploy	2,4-D ¹ Nimble Refine SG	Sword ⁸	Target ⁴		
Timothy	Seedling	2,4-D ¹		Badge ⁵ Bromotril ⁵ Brotex 240 ⁵	Buctril M ⁵ Koril ⁶ Logic M ⁵	Mextrol ⁵ Pardner ⁵	Sword ⁸ Target ⁴
	Established	2,4-D ¹		Badge Buctril M ⁵	Logic M ⁵ Mextrol ⁵	Sword ⁸	Target ⁴
Hay and Grazing	With Legumes	Caliber 400 Cobutox 600	Embutox 625 (all fall applied)				
	No Legumes	Caliber 400 Cobutox 600 2,4-D ¹	Embutox 625 (all fall applied)				

¹ Suppression only

² Pre-plant incorporate treatment

³ Used as crop desiccant

⁴ Under irrigation only

⁵ Seed production only

⁶ Spot treatment only

⁷ Underseeding only

⁸ Forage production only

* Glyphosate-based chemicals are Credit, Factor, Glyfos, Maverick, Roundup Transorb HC, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Touchdown, Vantage Plus Max

For more detailed selector chart information, visit www.agriculture.alberta.ca/herbicide

Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Perennial Sow-thistle				Plantain	Prickly Lettuce
Meadow Brome grass	Seedling	Attain, XC ^{1,5}	Glyphosate ^{6*}	Prestige, XC ⁵	Spectrum ^{1,5}		MCPA
	Established	Attain, XC ^{1,5} Glyphosate ^{6*}	Prestige, XC ⁵ Spectrum ^{1,5}	Sword ^{1,8}	Target ^{1,8}		MCPA
Smooth Brome grass	Seedling	Attain, XC ^{1,5} Badge ^{1,5} Banvel II ¹ Buctril M ^{1,5}	2,4-D ¹ Glyphosate ^{6*} Logic M ^{1,5}	Lontrel ¹ Mextrol ^{1,5} Prestige, XC ⁵	Spectrum ^{1,5} Sword ^{1,8} Target ^{1,8}		MCPA
	Established	Attain, XC ^{1,5} 2,4-D ¹ Glyphosate ^{6*}	Lontrel ¹ MCPA ¹	Prestige, XC ⁵ Spectrum ^{1,5}	Sword ^{1,8} Target ^{1,8}		MCPA
Crested Wheatgrass	Seedling	Attain, XC ^{1,5} Badge ^{1,5} Banvel II + Mixes ¹ Buctril M ^{1,5}	2,4-D ¹ Glyphosate ^{6*} Logic M ^{1,5}	Lontrel ¹ Mextrol ^{1,5} Prestige, XC ⁵	Spectrum ^{1,5} Sword ^{1,8} Target ^{1,8}		MCPA
	Established	Accurate ¹ Ally ¹ Attain, XC ^{1,5}	2,4-D ¹ Glyphosate ^{6*} Lontrel ¹	MCPA ¹ Prestige, XC ⁵ Spectrum ^{1,5}	Sword ^{1,8} Target ^{1,8}		MCPA
Intermediate Wheatgrass	Seedling	Attain, XC ^{1,5} Badge ^{1,5} Banvel II ¹ Buctril M ^{1,5}	2,4-D ¹ Glyphosate ^{6*} Logic M ^{1,5}	Lontrel ¹ Mextrol ^{1,5} Prestige, XC ⁵	Spectrum ^{1,5} Sword ^{1,8} Target ^{1,8}		MCPA
	Established	Accurate ¹ Ally ¹ Attain, XC ^{1,5}	2,4-D ¹ Glyphosate ^{6*} Lontrel ¹	MCPA ¹ Prestige, XC ⁵ Spectrum ^{1,5}	Sword ^{1,8} Target ^{1,8}		MCPA
Creeping Red Fescue	Seedling	Attain, XC ^{1,5} Badge ^{1,5} Banvel II ¹ Buctril M ^{1,5}	2,4-D ¹ Glyphosate ^{6*} Logic M ^{1,5}	Lontrel ¹ Mextrol ^{1,5} Prestige, XC ⁵	Spectrum ^{1,5} Sword ^{1,8} Target ^{1,8}		MCPA
	Established	Accurate ¹ Ally ¹ Attain, XC ^{1,5}	Banvel II ¹ 2,4-D ¹ Glyphosate ^{6*}	Lontrel ¹ MCPA ¹ Prestige, XC ⁵	Spectrum ^{1,5} Sword ^{1,8} Target ^{1,8}		MCPA
Tall Fescue	Seedling	Attain, XC ^{1,5} Badge ^{1,5} Banvel II + Mixes	Buctril M ^{1,5} 2,4-D ¹ Glyphosate ^{6*}	Logic M ^{1,5} Lontrel ¹	Mextrol ^{1,5} Spectrum ^{1,5}		MCPA
	Established	Attain, XC ^{1,5} 2,4-D ¹	Glyphosate ^{6*} Lontrel ¹	Prestige, XC ⁵ Spectrum ^{1,5}	Sword ^{1,8} Target ^{1,8}		MCPA
Orchard Grass	Seedling	Badge ^{1,5} Banvel II ¹ Buctril M ^{1,5}	2,4-D ¹ Glyphosate ^{6*} Logic M ^{1,5}	Lontrel ¹ Mextrol ^{1,5}	Sword ^{1,8} Target ^{1,8}		MCPA
	Established	Accurate ¹ Ally ¹	2,4-D ¹ Glyphosate ^{6*}	Lontrel ¹ Sword ^{1,8}	Target ^{1,8}		MCPA
Timothy	Seedling	Attain, XC ^{1,5} Badge ^{1,5} Banvel II + Mixes Buctril M ^{1,5}	Curtail M ¹ 2,4-D ¹ Glyphosate ^{6*} Infinity ^{1,5}	Logic M ^{1,5} Lontrel ¹ Mextrol ^{1,5} Prestige, XC ⁵	Spectrum ^{1,5} Sword ^{1,8} Target ^{1,8}		MCPA
	Established	Attain, XC ^{1,5} Badge ¹ Buctril M ¹ Curtail M	2,4-D ¹ Glyphosate ^{6*} Logic M ¹ Lontrel ¹	MCPA ¹ Mextrol ¹ Prestige, XC ⁵	Spectrum ^{1,5} Sword ^{1,8} Target ^{1,8}		MCPA
Hay and Grazing	With Legumes	Amitrol 240 ⁶ Caliber 400 ¹	Clovetox Plus ¹ Cobutox 600 ¹	Embutox 625 ¹ Glyphosate ^{6*}	Topside ¹ Tropotox Plus ¹	Clovetox Plus ¹ Topside ¹ Tropotox Plus ¹	
	No Legumes	Amitrol 240 ⁶ Banvel II + Mixes Caliber 400 ¹ Clovetox Plus ¹	Cobutox 600 ¹ 2,4-D ¹ Escort ¹ Embutox 625 ¹	Glyphosate ^{6*} Lontrel ¹ MCPA ¹	Topside ¹ Tropotox Plus ¹ Tordon 22K	Clovetox Plus ¹ Grazon Topside ¹ Tropotox Plus ¹	Grazon MCPA Remedy

- ¹ Suppression only
- ² Pre-plant incorporate treatment
- ³ Used as crop desiccant
- ⁴ Under irrigation only
- ⁵ Seed production only

- ⁶ Spot treatment only
- ⁷ Underseeding only
- ⁸ Forage production only
- * Glyphosate based chemicals are Credit, Factor, Glyfos, Maverick, Roundup Transorb HC, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Touchdown, Vantage Plus Max

Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Quack Grass	Redroot Pigweed				
Meadow Bromegrass	Seedling		Attain, XC ⁵ Deploy	Nimble	Prestige, XC ⁵	Refine SG	Spectrum ⁵
	Established		Attain, XC ⁵ Deploy	Nimble Prestige, XC ⁵	Refine SG Spectrum ⁵	Sword ⁶	Target ⁶
Smooth Bromegrass	Seedling	Glyphosate ^{6*}	Attain, XC ⁵ Badge ⁵ Banvel II + Mixes Basagran ⁵	Bromotril ⁵ Brotex 240 ⁵ Buctril M ⁵ Deploy	2,4-D Hoe-Grass II ⁵ Koril ⁵ Logic M ⁵	Mextrol ⁵ Nimble Pardner ⁵ Prestige, XC ⁵	Refine SG Spectrum ⁵ Sword ⁵ Target ⁶
	Established	Glyphosate ^{6*}	Attain, XC ⁵ Deploy	2,4-D MCPA ¹	Nimble Prestige, XC ⁵	Refine SG Spectrum ⁵	Sword ⁵ Target ⁶
Crested Wheatgrass	Seedling	Glyphosate ^{6*}	Attain, XC ⁵ Badge ⁵ Banvel II + Mixes Basagran ⁵	Bromotril ⁵ Brotex 240 ⁵ Buctril M ⁵ Deploy	2,4-D Hoe-Grass II ⁵ Koril ⁵ Logic M ⁵	Mextrol ⁵ Nimble Pardner ⁵ Prestige, XC ⁵	Refine SG Spectrum ⁵ Sword ⁵ Target ⁶
	Established	Glyphosate ^{6*}	Accurate Ally Attain, XC ⁵	Deploy 2,4-D MCPA ¹	Nimble Prestige, XC ⁵	Refine SG Spectrum ⁵	Sword ⁵ Target ⁶
Intermediate Wheatgrass	Seedling	Glyphosate ^{6*}	Attain, XC ⁵ Badge ⁵ Banvel II + Mixes Bromotril ⁵	Brotex 240 ⁵ Buctril M ⁵ Deploy 2,4-D	Hoe-Grass II ⁵ Koril ⁵ Logic M ⁵ Mextrol ⁵	Nimble Pardner ⁵ Prestige, XC ⁵ Refine SG	Spectrum ⁵ Sword ⁵ Target ⁶
	Established	Glyphosate ^{6*}	Accurate Ally Attain, XC ⁵	Deploy 2,4-D MCPA ¹	Nimble Prestige, XC ⁵	Refine SG Spectrum ⁵	Sword ⁵ Target ⁶
Creeping Red Fescue	Seedling	Glyphosate ^{6*} Poast Ultra ⁵	Attain, XC ⁵ Badge ⁵ Banvel II + Mixes Basagran ⁵	Bromotril ⁵ Brotex 240 ⁵ Buctril M ⁵ Deploy	2,4-D Hoe-Grass II ⁵ Koril ⁵ Logic M ⁵	Mextrol ⁵ Nimble Pardner ⁵ Prestige, XC ⁵	Refine SG Spectrum ⁵ Sword ⁵ Target ⁶
	Established	Assure II ⁵ Glyphosate ^{6*} Poast Ultra ⁵	Accurate Ally Attain, XC ⁵	Banvel II + Mixes Basagran ⁵ Deploy	2,4-D MCPA ¹ Nimble	Prestige, XC ⁵ Refine SG Spectrum ⁵	Sword ⁵ Target ⁶
Tall Fescue	Seedling	Glyphosate ^{6*}	Attain, XC ⁵ Badge ⁵ Banvel II + Mixes	Buctril M ⁵ Deploy	2,4-D Logic M ⁵	Mextrol ⁵ Nimble	Refine SG Spectrum ⁵
	Established	Glyphosate ^{6*}	Attain, XC ⁵ Deploy	2,4-D Nimble	Prestige, XC ⁵ Refine SG	Spectrum ⁵ Sword ⁵	Target ⁶
Orchard Grass	Seedling	Glyphosate ^{6*}	Banvel II + Mixes Badge ⁵ Basagran ⁵ Bromotril ⁵	Brotex 240 ⁵ Buctril M ⁵ Deploy	2,4-D Koril ⁵ Logic M ⁵	Mextrol ⁵ Nimble Pardner ⁵	Refine SG Sword ⁵ Target ⁶
	Established	Glyphosate ^{6*}	Accurate Ally	Deploy 2,4-D	Nimble Refine SG	Sword ⁵	Target ⁶
Timothy	Seedling	Glyphosate ^{6*}	Attain, XC ⁵ Badge ⁵ Banvel II + Mixes Basagran ⁵	Bromotril ⁵ Brotex 240 ⁵ Buctril M ⁵ Curtail M	2,4-D Infinity ⁵ Koril ⁵ Logic M ⁵	Mextrol ⁵ Pardner ⁵ Prestige, XC ⁵	Spectrum ⁵ Sword ⁵ Target ⁶
	Established	Glyphosate ^{6*}	Attain, XC ⁵ Badge ⁵ Basagran ⁵	Buctril M Curtail M 2,4-D	Logic M MCPA ¹ Mextrol	Prestige, XC ⁵ Spectrum ⁵	Sword ⁵ Target ⁶
Hay and Grazing	With Legumes	Amitrol 240 ⁵ Glyphosate ^{6*} Kerb	Caliber 400 Clovitox Plus	Cobutox 600	Embutox 625	Topside	Tropotox Plus
	No Legumes	Amitrol 240 ⁵ Glyphosate ^{6*} Kerb	Banvel II + Mixes Caliber 400	Clovitox Plus Cobutox 600	2,4-D Embutox 625	MCPA Topside	Tropotox Plus

¹ Suppression only

² Pre-plant incorporate treatment

³ Used as crop desiccant

⁴ Under irrigation only

⁵ Seed production only

⁶ Spot treatment only

⁷ Underseeding only

⁸ Forage production only

* Glyphosate-based chemicals are Credit, Factor, Glyfos, Maverick, Roundup Transorb HC, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Touchdown, Vantage Plus Max

Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Russian Thistle			Scentless Chamomile (seedlings)			
Meadow Brome	Seedling	Attain, XC ³	Deploy	Nimble	Refine SG	Prestige, XC ³		
	Established	Attain, XC ³ Deploy	Nimble Refine SG	Sword ⁶	Target ⁶	Prestige, XC ³		
Smooth Brome	Seedling	Attain, XC ³ Badge ⁵ Banvel II + Mixes Basagran ³ Bromotril ³	Brotex 240 ³ Buctril M ³ Deploy 2,4-D Hoe-Grass II ³	Koril ³ Logic M ³ Mextrol ³ Nimble	Pardner ³ Refine SG Sword ⁶ Target ⁶	Badge ⁵ Bromotril ³ Buctril M ³ Hoe-Grass II ³	Koril ³ Logic M ³ Lontrel	Mextrol ³ Pardner ³ Prestige, XC ³
	Established	Attain, XC ³ Deploy	2,4-D Nimble	Refine SG Sword ⁶	Target ⁶	Lontrel	Prestige, XC ³	
Crested Wheatgrass	Seedling	Attain, XC ³ Badge ⁵ Banvel II + Mixes Basagran ³ Bromotril ³	Brotex 240 ³ Buctril M ³ Deploy 2,4-D Hoe-Grass II ³	Koril ³ Logic M ³ Mextrol ³ Nimble	Pardner ³ Refine SG Sword ⁶ Target ⁶	Badge ⁵ Bromotril ³ Buctril M ³ Hoe-Grass II ³	Koril ³ Logic M ³ Lontrel	Mextrol ³ Pardner ³ Prestige, XC ³
	Established	Accurate ¹ Ally ¹ Attain, XC ³	Deploy 2,4-D	Nimble Refine SG	Sword ⁶ Target ⁶	Accurate Ally	Lontrel	Prestige, XC ³
Intermediate Wheatgrass	Seedling	Attain, XC ³ Badge ⁵ Banvel II + Mixes Bromotril ³ Brotex 240 ³	Buctril M ³ Deploy 2,4-D Hoe-Grass II ³	Koril ³ Logic M ³ Mextrol ³ Nimble	Pardner ³ Refine SG Sword ⁶ Target ⁶	Badge ⁵ Bromotril ³ Buctril M ³ Hoe-Grass II ³	Koril ³ Logic M ³ Lontrel	Mextrol ³ Pardner ³ Prestige, XC ³
	Established	Ally ¹ Attain, XC ³	Deploy 2,4-D	Nimble Refine SG	Sword ⁶ Target ⁶	Accurate Ally	Lontrel	Prestige, XC ³
Creeping Red Fescue	Seedling	Attain, XC ³ Badge ⁵ Banvel II + Mixes Basagran ³ Bromotril ³	Brotex 240 ³ Buctril M ³ Deploy 2,4-D Hoe-Grass II ³	Koril ³ Logic M ³ Mextrol ³ Nimble	Pardner ³ Refine SG Sword ⁶ Target ⁶	Badge ⁵ Bromotril ³ Buctril M ³ Hoe-Grass II ³	Koril ³ Logic M ³ Lontrel	Mextrol ³ Pardner ³ Prestige, XC ³
	Established	Accurate ¹ Ally ¹ Attain, XC ³	Banvel II + Mixes Deploy 2,4-D	Nimble Refine SG	Sword ⁶ Target ⁶	Accurate Ally	Lontrel	Prestige, XC ³
Tall Fescue	Seedling	Attain, XC ³ Badge ⁵ Banvel II + Mixes	Buctril M ³ Deploy	2,4-D Logic M ³	Mextrol ³ Nimble Refine SG	Badge ⁵ Buctril M ³	Logic M ³ Lontrel	Mextrol ³
	Established	Attain, XC ³ Deploy	2,4-D Nimble	Refine SG Sword ⁶	Target ⁶	Lontrel	Prestige, XC ³	
Orchard Grass	Seedling	Banvel II + Mixes Basagran ³ Bromotril ³ Brotex 240 ³	Buctril M ³ Deploy 2,4-D Koril ³	Logic M ³ Pardner ³ Nimble	Refine SG Sword ⁶ Target ⁶	Badge ⁵ Bromotril ³ Buctril M ³	Koril ³ Logic M ³ Lontrel	Mextrol ³ Pardner ³
	Established	Accurate Ally	Deploy 2,4-D	Nimble Refine SG	Sword ⁶ Target ⁶	Accurate Ally	Lontrel	
Timothy	Seedling	Attain, XC ³ Badge ⁵ Banvel II + Mixes Basagran ³	Bromotril ³ Brotex 240 ³ Buctril M ³ 2,4-D	Infinity ² Koril ³ Logic M ³ Mextrol ³	Pardner ³ Sword ⁶ Target ⁶	Badge ⁵ Bromotril ³ Buctril M ³ Curtail M	Koril ³ Logic M ³ Lontrel	Mextrol ³ Pardner ³ Prestige, XC ³
	Established	Attain, XC ³ Badge	Buctril M 2,4-D	Logic M Mextrol	Sword ⁶ Target ⁶	Badge Buctril M Curtail M	Logic M Lontrel	Mextrol Prestige, XC ³
Hay and Grazing	With Legumes							
	No Legumes	Banvel II + Mixes 2,4-D	Escort	Sword ⁶	Target ⁶	Escort	Lontrel	Tordon 22K

¹ Suppression only

² Pre-plant incorporate treatment

³ Used as crop desiccant

⁴ Under irrigation only

⁵ Seed production only

⁶ Spot treatment only

⁷ Underseeding only

⁸ Forage production only

* Glyphosate-based chemicals are Credit, Factor, Glyfos, Maverick, Roundup Transorb HC, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Touchdown, Vantage Plus Max

Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Shepherd's-purse (seedlings)				
Meadow Brome	Seedling	Attain, XC ¹ Deploy	MCPA Nimble	Prestige, XC ⁵ Refine SG	Spectrum ³	
	Established	Attain, XC ¹ Deploy	MCPA Nimble	Prestige, XC ⁵ Refine SG	Spectrum ³ Sword ⁶	Target ⁸
Smooth Brome	Seedling	Attain, XC ¹ Badge ² Banvel II + Mixes Basagran ³	Buctril M ³ Deploy 2,4-D	Logic M ³ MCPA Mextrol ⁷	Nimble Prestige, XC ⁵ Refine SG	Spectrum ³ Sword ⁶ Target ⁸
	Established	Attain, XC ¹ Deploy	2,4-D MCPA ³	Nimble Prestige, XC	Refine SG Spectrum ³	Sword ⁶ Target ⁸
Crested Wheatgrass	Seedling	Attain, XC ¹ Badge ² Banvel II + Mixes Basagran ³	Buctril M ³ Deploy 2,4-D	Logic M ³ MCPA Mextrol ⁷	Nimble Prestige, XC ⁵ Refine SG	Spectrum ³ Sword ⁶ Target ⁸
	Established	Accurate Ally Attain, XC ¹	Deploy 2,4-D MCPA	Nimble Prestige, XC ⁵	Refine SG Spectrum ³	Sword ⁶ Target ⁸
Intermediate Wheatgrass	Seedling	Attain, XC ¹ Badge ² Banvel II + Mixes	Buctril M ³ Deploy 2,4-D	Logic M ³ MCPA Mextrol ⁷	Nimble Prestige, XC ⁵ Refine SG	Spectrum ³ Sword ⁶ Target ⁸
	Established	Accurate Ally Attain, XC ¹	Deploy 2,4-D MCPA	Nimble Prestige, XC ⁵	Refine SG Spectrum ³	Sword ⁶ Target ⁸
Creeping Red Fescue	Seedling	Attain, XC ¹ Badge ² Banvel II + Mixes Basagran ³	Buctril M ³ Deploy 2,4-D	Logic M ³ MCPA Mextrol ⁷	Nimble Prestige, XC ⁵ Refine SG	Spectrum ³ Sword ⁶ Target ⁸
	Established	Accurate Ally Attain, XC ¹	Banvel II + Mixes Deploy 2,4-D	MCPA Nimble Prestige, XC ⁵	Refine SG Spectrum ³	Sword ⁶ Target ⁸
Tall Fescue	Seedling	Attain, XC ¹ Badge ² Buctril M ³	Deploy 2,4-D	Logic M ³ MCPA	Mextrol ⁷ Nimble	Refine SG Spectrum ³
	Established	Attain, XC ¹ Deploy	2,4-D MCPA	Nimble Prestige, XC ⁵	Refine SG Spectrum ³	Sword ⁶ Target ⁸
Orchard Grass	Seedling	Badge ² Banvel II + Mixes Basagran ³	Buctril M ³ Deploy 2,4-D	Logic M ³ MCPA Mextrol ⁷	Nimble Refine SG	Sword ⁶ Target ⁸
	Established	Accurate Ally	Deploy 2,4-D	MCPA Nimble	Refine SG Sword ⁶	Target ⁸
Timothy	Seedling	Attain, XC ¹ Badge ² Banvel II + Mixes	Basagran ³ Buctril M ³ Curtail M	2,4-D Infinity ³ Logic M ³	MCPA Mextrol ⁷ Prestige, XC ⁵	Spectrum ³ Sword ⁶ Target ⁸
	Established	Attain, XC ¹ Badge Buctril M	Curtail M 2,4-D Logic M	MCPA Mextrol	Prestige, XC ⁵ Spectrum ³	Sword ⁶ Target ⁸
Hay and Grazing	With Legumes	Caliber 400 Clovitox Plus	Cobutox 600	Embutox 625	Topside	Tropotox Plus
	No Legumes	Banvel II + Mixes Caliber 400	Clovitox Plus Cobutox 600	2,4-D Embutox 625	MCPA Topside	Tropotox Plus

¹ Suppression only

² Pre-plant incorporate treatment

³ Used as crop desiccant

⁴ Under irrigation only

⁵ Seed production only

⁶ Spot treatment only

⁷ Underseeding only

⁸ Forage production only

⁹ Glyphosate-based chemicals are Credit, Factor, Glyfos, Maverick, Roundup Transorb HC, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Touchdown, Vantage Plus Max

For more detailed selector chart information, visit www.agriculture.alberta.ca/herbicide

Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Stinkweed (seedlings)					Tansy	Toadflax	
Meadow Brome	Seedling	Attain, XC ⁵ Deploy	MCPA Nimble	Prestige, XC ⁵	Refine SG	Spectrum ⁵		Deploy ¹ Glyphosate ^{6**}	Nimble ¹ Refine SG ¹
	Established	Attain, XC ⁵ Deploy	MCPA Nimble	Prestige, XC ⁵ Refine SG	Spectrum ⁵ Sword ⁸	Target ⁶		Deploy ¹ Glyphosate ^{6**}	Nimble ¹ Refine SG ¹
Smooth Brome	Seedling	Attain, XC ⁵ Badge ⁵ Basagran ⁵ Bromotril ⁵	Brotex 240 ⁵ Buctril M ⁵ Deploy 2,4-D	Hoe-Grass II ⁵ Koril ⁵ Logic M ⁵ MCPA	Mextrol ⁵ Nimble Pardner ⁵ Prestige, XC ⁵	Refine SG Spectrum ⁵ Sword ⁸ Target ⁶		Deploy ¹ Glyphosate ^{6**}	Nimble ¹ Refine SG ¹
	Established	Attain, XC ⁵ Deploy	2,4-D MCPA	Nimble Prestige, XC ⁵	Refine SG Spectrum ⁵	Sword ⁸ Target ⁶		Deploy ¹ Glyphosate ^{6**}	Nimble ¹ Refine SG ¹
Crested Wheatgrass	Seedling	Attain, XC ⁵ Badge ⁵ Basagran ⁵ Bromotril ⁵	Brotex 240 ⁵ Buctril M ⁵ Deploy 2,4-D	Hoe-Grass II ⁵ Koril ⁵ Logic M ⁵ MCPA	Mextrol ⁵ Nimble Pardner ⁵ Prestige, XC ⁵	Refine SG Spectrum ⁵ Sword ⁸ Target ⁶		Deploy ¹ Glyphosate ^{6**} Nimble ¹ Refine SG ¹	
	Established	Accurate Ally Attain, XC ⁵	Deploy 2,4-D MCPA	Nimble Prestige, XC ⁵	Refine SG Spectrum ⁵	Sword ⁸ Target ⁶		Accurate ¹ Ally ¹ Deploy ¹	Glyphosate ^{6**} Nimble ¹ Refine SG ¹
Intermediate Wheatgrass	Seedling	Attain, XC ⁵ Badge ⁵ Bromotril ⁵ Brotex 240 ⁵	Buctril M ⁵ Deploy 2,4-D Hoe-Grass II ⁵	Koril ⁵ Logic M ⁵ MCPA Mextrol ⁵	Nimble Pardner ⁵ Prestige, XC ⁵ Refine SG	Spectrum ⁵ Sword ⁸ Target ⁶		Deploy ¹ Glyphosate ^{6**}	Nimble ¹ Refine SG ¹
	Established	Accurate Ally Attain, XC ⁵	Deploy 2,4-D MCPA	Nimble Prestige, XC ⁵	Refine SG Spectrum ⁵	Sword ⁸ Target ⁶		Accurate ¹ Ally ¹ Deploy ¹	Glyphosate ^{6**} Nimble ¹ Refine SG ¹
Creeping Red Fescue	Seedling	Attain, XC ⁵ Badge ⁵ Basagran ⁵ Bromotril ⁵	Brotex 240 ⁵ Buctril M ⁵ Deploy 2,4-D	Hoe-Grass II ⁵ Koril ⁵ Logic M ⁵ MCPA	Mextrol ⁵ Nimble Pardner ⁵ Prestige, XC ⁵	Refine SG Spectrum ⁵ Sword ⁸ Target ⁶		Deploy ¹ Glyphosate ^{6**}	Nimble ¹ Refine SG ¹
	Established	Accurate Ally Attain, XC ⁵	Banvel II + Mixes Deploy	2,4-D MCPA Nimble	Prestige, XC ⁵ Refine SG Spectrum ⁵	Sword ⁸ Target ⁶		Accurate ¹ Ally ¹ Deploy ¹	Glyphosate ^{6**} Nimble ¹ Refine SG ¹
Tall Fescue	Seedling	Attain, XC ⁵ Badge ⁵ Banvel II + Mixes	Buctril M ⁵ Deploy 2,4-D	Logic M ⁵ MCPA	Mextrol ⁵ Nimble	Refine SG Spectrum ⁵		Deploy ¹ Glyphosate ^{6**}	Nimble ¹ Refine SG ¹
	Established	Attain, XC ⁵ Deploy	2,4-D MCPA	Nimble Prestige, XC ⁵	Refine SG Spectrum ⁵	Sword ⁸ Target ⁶		Deploy ¹ Glyphosate ^{6**}	Nimble ¹ Refine SG ¹
Orchard Grass	Seedling	Badge ⁵ Banvel II + Mixes Basagran ⁵	Bromotril ⁵ Brotex 240 ⁵ Buctril M ⁵ Deploy	2,4-D Koril ⁵ Logic M ⁵ MCPA	Mextrol ⁵ Nimble Pardner ⁵	Refine SG Sword ⁸ Target ⁶		Deploy ¹ Glyphosate ^{6**}	Nimble ¹ Refine SG ¹
	Established	Accurate Ally	Deploy 2,4-D	MCPA Nimble	Refine SG Sword ⁸	Target ⁶		Accurate ¹ Ally ¹ Deploy ¹	Glyphosate ^{6**} Nimble ¹ Refine SG ¹
Timothy	Seedling	Attain, XC ⁵ Badge ⁵ Banvel II + Mixes Basagran ⁵	Bromotril ⁵ Brotex 240 ⁵ Buctril M ⁵ Curtail M	2,4-D Infinity ⁵ Koril ⁵ Logic M ⁵	MCPA Mextrol ⁵ Pardner ⁵ Prestige, XC ⁵	Spectrum ⁵ Sword ⁸ Target ⁶		Glyphosate ^{6**}	
	Established	Attain, XC ⁵ Badge Buctril M	Curtail M 2,4-D Logic M	MCPA Mextrol	Prestige, XC ⁵ Spectrum ⁵	Sword ⁸ Target ⁶		Glyphosate ^{6**}	
Hay and Grazing	With Legumes	Cobutox 600 Caliber 400	Clovitox Plus	Embutox 625	Topside	Tropotox Plus		Amitrol 240 ⁶	Glyphosate ^{6**}
	No Legumes	Banvel II + Mixes Cobutox 600	Caliber 400 Clovitox Plus	2,4-D Embutox 625	MCPA Topside	Tropotox Plus	Escort	Amitrol 240 ⁶ Glyphosate ^{6**}	Tordon 22K

NOTE: See footnotes on next page.

Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Wild Buckwheat					Wild Oats
Meadow Brome grass	Seedling	Attain, XC ⁵ Deploy	2,4-D ¹ MCPA ¹	Nimble Prestige, XC ⁵	Refine SG	Spectrum ⁵	Avenge ⁷
	Established	Attain, XC ⁵ Deploy	2,4-D ¹ MCPA ¹	Nimble Prestige, XC ⁵	Refine SG Spectrum ⁵	Sword ⁸ Target ⁸	
Smooth Brome grass	Seedling	Attain, XC ⁵ Badge ⁵ Banvel II + Mixes Bromotril ⁶ Brotex 240 ⁵	Buctril M ⁶ Deploy 2,4-D ¹ Hoe-Grass II	Koril ⁵ Logic M ⁵ Lontrel MCPA ¹	Mextrol ⁶ Nimble Pardner ⁵ Prestige, XC ⁵	Refine SG Spectrum ⁵ Sword ⁸ Target ⁸	Avenge ⁷ Hoe-Grass II ⁵
	Established	Attain, XC ⁵ Deploy 2,4-D ¹	Lontrel MCPA ¹	Nimble Prestige, XC ⁵	Refine SG Spectrum ⁵	Sword ⁸ Target ⁸	
Crested Wheatgrass	Seedling	Attain, XC ⁵ Badge ⁵ Banvel II + Mixes Bromotril ⁶ Brotex 240 ⁵	Buctril M ⁶ Deploy 2,4-D ¹ Hoe-Grass II ⁵	Koril ⁵ Logic M ⁵ Lontrel MCPA ¹	Mextrol ⁶ Nimble Pardner ⁵ Prestige, XC ⁵	Refine SG Spectrum ⁵ Sword ⁸ Target ⁸	Avenge ⁷ Hoe-Grass II ⁵
	Established	Accurate ¹ Ally ¹ Attain, XC ⁵	Deploy 2,4-D ¹ Lontrel	MCPA ¹ Nimble Prestige, XC ⁵	Refine SG Spectrum ⁵	Sword ⁸ Target ⁸	
Intermediate Wheatgrass	Seedling	Attain, XC ⁵ Badge ⁵ Banvel II + Mixes Bromotril ⁶ Brotex 240 ⁵	Buctril M ⁶ Deploy 2,4-D ¹ Hoe-Grass II ⁵	Koril ⁵ Logic M ⁵ Lontrel MCPA ¹	Mextrol ⁶ Nimble Pardner ⁵ Prestige, XC ⁵	Refine SG Spectrum ⁵ Sword ⁸ Target ⁸	Hoe-Grass II ⁵
	Established	Accurate ¹ Ally ¹ Attain, XC ⁵	Deploy 2,4-D ¹ Lontrel	MCPA ¹ Nimble Prestige, XC ⁵	Refine SG Spectrum ⁵	Sword ⁸ Target ⁸	
Creeping Red Fescue	Seedling	Attain, XC ⁵ Badge ⁵ Banvel II + Mixes Bromotril ⁶ Brotex 240 ⁵	Buctril M ⁶ Deploy 2,4-D ¹ Hoe-Grass II ⁵	Koril ⁵ Logic M ⁵ Lontrel MCPA ¹	Mextrol ⁶ Nimble Pardner ⁵ Prestige, XC ⁵	Refine SG Spectrum ⁵ Sword ⁸ Target ⁸	Avenge ⁷ Hoe-Grass II ⁵ Poast Ultra ⁵
	Established	Accurate ¹ Ally ¹ Attain, XC ⁵	Banvel II + Mixes Deploy	2,4-D ¹ Lontrel MCPA ¹	Nimble Prestige, XC ⁵ Refine SG	Spectrum ⁵ Sword ⁸ Target ⁸	Assure II ⁵ Poast Ultra ⁵
Tall Fescue	Seedling	Attain, XC ⁵ Badge ⁵ Banvel II + Mixes	Buctril M ⁶ Deploy 2,4-D ¹	Logic M ⁵ Lontrel MCPA ¹	Mextrol ⁶ Nimble	Refine SG Spectrum ⁵	Avenge ⁷
	Established	Attain, XC ⁵ Deploy 2,4-D ¹	Lontrel MCPA ¹	Nimble Prestige, XC ⁵	Refine SG Spectrum ⁵	Sword ⁸ Target ⁸	
Orchard Grass	Seedling	Badge ⁵ Banvel II + Mixes Bromotril ⁶ Brotex 240 ⁵	Buctril M ⁶ Deploy 2,4-D ¹ Koril ⁵	Logic M ⁵ Lontrel MCPA ¹	Mextrol ⁶ Nimble Pardner ⁵	Refine SG Sword ⁸ Target ⁸	Avenge ⁷
	Established	Accurate ¹ Ally ¹	Deploy 2,4-D ¹	Lontrel MCPA ¹	Nimble Refine SG	Sword ⁸ Target ⁸	
Timothy	Seedling	Attain, XC ⁵ Badge ⁵ Banvel II + Mixes Bromotril ⁶	Brotex 240 ⁵ Buctril M ⁶ Curtail M 2,4-D ¹	Infinity ⁵ Koril ⁵ Logic M ⁵ Lontrel	MCPA ¹ Mextrol Pardner ⁵ Prestige, XC ⁵	Spectrum ⁵ Sword ⁸ Target ⁸	Avenge ⁷
	Established	Attain, XC ⁵ Badge Buctril M	Curtail M 2,4-D ¹ Logic M	Lontrel MCPA ¹ Mextrol	Prestige, XC ⁵ Spectrum ⁵	Sword ⁸ Target ⁸	
Hay and Grazing	With Legumes	Caliber 400	Cobutox 600	Embutox 625			Kerb
	No Legumes	Banvel II + Mixes Caliber 400	Cobutox 600 2,4-D ¹	Embutox 625	Lontrel	MCPA ¹	Kerb

¹ Suppression only

² Pre-plant incorporate treatment

³ Used as crop desiccant

⁴ Under irrigation only

⁵ Seed production only

⁶ Spot treatment only

⁷ Underseeding only

⁸ Forage production only

^{*} Glyphosate-based chemicals are Cheminova Glyphosate, Clearout 41, Credit; Credit 45; Factor 540; Glyfos, Knockout, Maverick III; NuGlo; R/T 540; Roundup Transorb II; Roundup Ultra 2; Roundup Weather Max; Sharpshooter; Sharpshooter Plus; Touchdown iQ; Touchdown Total; Traxion; Vantage Plus Max II, Wise Up

For more detailed selector chart information, visit www.agriculture.alberta.ca/herbicide

Herbicide Selector Chart – Other Crops

Crop	American Nightshade	Annual Smartweed/Lady's Thumb			Annual Sow-thistle	
Beans	Dual II Magnum	Basagran	Basagran Forte			
Check label						
Canary Seed	Badge Bromotril Brotex 240 Buctril M Koril Logic M Mextrol Pardner	Badge Banvel II Bromotril Brotex 240	Buctril M Koril Logic M Mextrol	Pardner Sword Target Tracker XP	Curtail M Prestige Sword	Target Tracker XP
Chickpeas		Sencor				
Field Corn	Badge Bromotril Brotex 240 Buctril M Dual II Magnum Koril Logic M Mextrol Pardner Primextra II Magnum	Aatrex Liquid 480 Aatrex Nine-0 Atrazine Arazine 480 Badge Banvel II Basagran Basagran Forte Bromotril	Brotex 240 Buctril M Cobutox 600 ¹ 2,4-D 2,4-DB ¹ DyVel DSp Embutox Koril Laddok	Logic M MCPA Amine ¹ MCPA K-salt MCPA Na-salt Mextrol Pardner Primextra II Magnum Princep Nine-T	Clovitox Plus ¹ 2,4-D DyVel DSp MCPA Amine ¹	MCPA K-salt MCPA Na-salt Topside Tropotox Plus
Liberty Link Corn		Liberty 200 SN				
Roundup Ready Corn	Glyphosate*	Glyphosate*			Glyphosate*	
Sweet Corn	Badge Bromotril Brotex 240 Buctril M Dual II Magnum Koril Logic M Mextrol Pardner	Aatrex Liquid 480 Aatrex Nine-0 Atrazine Arazine 480 Badge Basagran	Basagran Forte Bromotril Brotex 240 Buctril M DyVel DSp	Koril Laddok Logic M Mextrol Pardner	DyVel DSp	
Fababeans		Basagran	Basagran Forte			
Lentils		Odyssey ²	Odyssey DLX ²	Sencor		
Peas	Dual II Magnum	Basagran Basagran Forte MCPA Amine ¹ MCPA Na-salt	Odyssey Odyssey DLX Pursuit	Sencor Solo Viper	Clovitox Plus ¹ MCPA Amine ¹ MCPA Na-salt ¹	Topside Tropotox Plus
Check label to ensure chosen chemical or mix is registered for use on the crop						
Potatoes Irrigated (irr)	Dual II Magnum	Sencor				

¹ Suppression only

² Pre-emergence to crop, post-emergent to weeds

³ Used as crop desiccant

⁴ CLEARFIELD tolerant lentils only

⁵ Non-Clearfield varieties

* Glyphosate-based chemicals registered for Roundup Ready Corn are Factor 540, Roundup Transorb HC, Roundup Ultra2, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Vantage Plus Max

Herbicide Selector Chart – Other Crops

Crop	Barnyard Grass			Canada Thistle		Cleavers
Beans Check label	Advance 10G Arrow 240 EC Assure II Bonanza	Centurion Dual II Magnum Edge Eptam	Poast Ultra Rival Select Treffan	Basagran ¹	Basagran Forte ¹	Basagran Basagran Forte Edge ¹
Canary Seed				Badge ¹ Banvel II Buctril M ¹ Curtail M Logic M ¹	Mextrol ¹ Prestige Sword ¹ Target ¹ Tracker XP ¹	Banvel II Prestige Sword Target Tracker XP
Chickpeas	Arrow Assure II Centurion	Poast Ultra Select Yuma				
Field Corn	Accent Dual II Magnum	Primextra II Magnum	Princep Nine-T	Badge ¹ Banvel II ¹ Basagran ¹ Basagran Forte ¹ Buctril M Clovitox Plus ¹ Cobutox 600 ¹ DyVel DSp ¹ Embutox	Logic M ¹ MCPA Amine ¹ MCPA K-salt ¹ MCPA Na-salt ¹ 2,4-DB ¹ Mextrol ¹ Topside ¹ Tropotox Plus ¹	Banvel II Basagran Basagran Forte DyVel DSp ¹
Liberty Link Corn	Liberty 200 SN			Liberty 200 SN		
Roundup Ready Corn	Glyphosate*			Glyphosate*		Glyphosate*
Sweet Corn	Accent	Dual II Magnum		Badge ¹ Basagran ¹ Basagran Forte ¹ Buctril M ¹	DyVel DSp ¹ Logic M ¹ Mextrol ¹	Basagran Basagran Forte DyVel DSp ¹
Fababeans	Advance 10G Bonanza	Edge Poast Ultra	Rival Treffan	Basagran ¹	Basagran Forte ¹	Basagran Basagran Forte Edge ¹
Lentils	Advance 10G Arrow 240 EC Assure II Bonanza Centurion	Edge Fusion Odyssey ⁴ Odyssey DLX ¹ Poast Ultra	Rival Select Solo ⁴ Treffan Yuma			Edge ¹ Odyssey ⁴ Odyssey DLX ¹ Solo ^{1,3}
Peas Check label to ensure chosen chemical or mix is registered for use on the crop	Advance 10G Arrow 240 EC Assure II Bonanza Centurion Dual II Magnum	Edge Fusion Odyssey Odyssey DLX Poast Ultra Rival	Rival 10G Select Solo Treffan Viper Yuma	Basagran ¹ Basagran Forte ¹ Clovitox Plus ¹ MCPA Amine ¹	MCPA Na-salt ¹ Topside ¹ Tropotox Plus ¹	Basagran Basagran Forte Edge ¹ Odyssey Odyssey DLX Pursuit Solo ¹ Viper ¹
Potatoes Irrigated (irr)	Arrow 240 EC Centurion Dual II Magnum	Eptam Poast Ultra Prism (irr)	Select			

¹ Suppression only

² Pre-emergence to crop, post-emergent to weeds

³ Used as crop desiccant

⁴ CLEARFIELD tolerant lentils only

⁵ Non-Clearfield varieties

* Glyphosate-based chemicals registered for Roundup Ready Corn are Factor 540, Roundup Transorb HC, Roundup Ultra2, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Vantage Plus Max

For more detailed selector chart information, visit www.agriculture.alberta.ca/herbicide

Herbicide Selector Chart – Other Crops

Crop	Cocklebur		Common Chickweed		Common Groundsel		Corn Spurry
Beans	Basagran	Basagran Forte	Advance 10G	Edge	Basagran		Basagran
Check label			Basagran	Eptam			Basagran Forte
			Basagran Forte	Rival			Edge
			Bonanza	Treflan			Eptam
Canary Seed	Badge	Koril	Prestige		Badge	Koril	Banvel II
	Banvel II + MCPA	Logic M			Bromotril	Logic M	Sword
	Bromotril	Mextrol			Brotex 240	Mextrol	Target
	Brotex 240	Pardner			Buctril M	Pardner	Tracker XP
	Buctril M				Curtail M		
Chickpeas			Sencor				Sencor
Field Corn	Badge	Koril	Basagran	Laddok	Badge	2,4-D	Banvel II
	Basagran	Laddok	Basagran Forte		Basagran	Koril	Basagran
	Basagran Forte	Logic M	2,4-D		Basagran Forte	Laddok	Basagran Forte
	Bromotril	MCPA amine			Bromotril	Logic M	DyVel DSP
	Brotex 240	MCPA K-salt			Brotex 240	Mextrol	Laddok
	Buctril M	MCPA Na-salt			Buctril M	Pardner	
	2,4-D	Mextrol					
	DyVel DSP	Pardner					
Liberty Link Corn	Liberty 200 SN		Liberty 200 SN				
Roundup Ready Corn	Glyphosate*	Princep Nine-T	Glyphosate*	Princep Nine-T			Glyphosate*
	Primextra II		Primextra II				
	Magnum		Magnum				
Sweet Corn	Badge	DyVel DSP	Basagran	Laddok	Badge	Koril	Basagran
	Basagran	Koril	Basagran Forte		Basagran	Laddok	Basagran Forte
	Basagran Forte	Laddok			Basagran Forte	Logic M	DyVel DSP
	Bromotril	Logic M			Bromotril	Mextrol	Laddok
	Brotex 240	Pardner			Brotex 240	Pardner	
	Buctril M				Buctril M		
Fababeans	Basagran	Basagran Forte	Advance 10G	Edge	Basagran		Basagran
			Basagran	Rival	Basagran Forte		Basagran Forte
			Basagran Forte	Treflan			Edge
			Bonanza				
Lentils			Advance 10G	Odyssey DLX ¹			Edge
			Bonanza	Rival			Sencor
			Edge	Sencor			
			Odyssey ²	Treflan			
Peas	Basagran	MCPA amine	Advance 10G	Odyssey DLX	Basagran		Basagran
Check label to ensure	Basagran Forte	MCPA Na-salt	Basagran	Pursuit	Basagran Forte		Basagran Forte
chosen chemical or			Basagran Forte	Rival			Edge
mix is registered for			Bonanza	Sencor			Sencor
use on the crop			Edge	Treflan			
			Odyssey				
Potatoes Irrigated (irr)			Eptam	Sencor			Eptam
							Sencor

¹ Suppression only

² Pre-emergence to crop, post-emergent to weeds

³ Used as crop desiccant

⁴ CLEARFIELD tolerant lentils only

⁵ Non-Clearfield varieties

* Glyphosate-based chemicals registered for Roundup Ready Corn are Factor 540, Roundup Transorb HC, Roundup Ultra2, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Vantage Plus Max

Herbicide Selector Chart – Other Crops

Crop	Cow Cockle		Green Foxtail		Hairy Nightshade	Hemp-nettle
Beans Check label	Advance 10G Bonanza Edge	Rival Treflan	Advance 10G Arrow 240 EC Assure II Bonanza Centurion Dual II Magnum	Edge Eptam Poast Ultra Rival Select Treflan Yuma	Basagran Basagran Forte Eptam Pursuit	Edge ¹ Eptam
Canary Seed	Badge Banvel II Banvel II + MCPA Bromotril Brotex 240 Buctril M Koril	Logic M Mextrol Pardner Sword Target Tracker XP				Banvel II + MCPA K-salt Prestige ² Sword Target Tracker XP
Chickpea			Arrow Assure II Centurion	Poast Ultra Select Yuma		Sencor
Field Corn	Badge Banvel II Bromotril Brotex 240 Buctril M	DyVel DSp Koril Logic M Mextrol Pardner	Accent Dual II Magnum	Primextra II Magnum	Basagran Basagran Forte	Clovitox Plus ¹ MCPA Amine ¹ MCPA K-salt ¹ MCPA Na-salt ¹ Topside Tropotox Plus
Liberty Link Corn			Liberty 200 SN			
Roundup Ready Corn	Glyphosate* Primextra II Magnum	Princep Nine-T	Glyphosate* Primextra II Magnum	Princep Nine-T	Glyphosate*	Glyphosate*
Sweet Corn	Badge Bromotril Brotex 240 Buctril M DyVel DSp	Koril Logic M Mextrol Pardner	Accent Dual II Magnum		Basagran Basagran Forte	
Fababeans	Advance 10G Bonanza Edge	Rival Treflan	Advance 10G Bonanza Edge	Poast Ultra Rival Treflan	Basagran Basagran Forte	Edge
Lentils	Advance 10G Bonanza Edge	Rival Solo ⁴ Treflan	Advance 10G Arrow 240 EC Assure II Bonanza Centurion Equinox Fusion Odyssey ⁵	Odyssey DLX ¹ Poast Ultra Rival Select Solo ⁴ Treflan Yuma		Edge Odyssey ⁵ Odyssey DLX ¹ Sencor
Peas Check label to ensure chosen chemical or mix is registered for use on the crop	Advance 10G Bonanza Edge Rival	Solo Treflan Viper	Advance 10G Arrow 240 EC Assure II Bonanza Centurion Edge Equinox Fusion Odyssey	Odyssey DLX Poast Ultra Pursuit Rival Select Solo Treflan Viper Yuma	Basagran Basagran Forte	Clovitox Plus ¹ Edge ¹ MCPA Amine ¹ MCPA Na-salt ¹ Odyssey ⁵ Odyssey DLX ¹ Pursuit Sencor Topside Tropotox Plus
Potatoes Irrigated (irr)			Arrow 240 EC Centurion Dual II Magnum Eptam	Poast Ultra Prism (irr) Select	Eptam	Sencor

¹ Suppression only

² Pre-emergence to crop, post-emergent to weeds

³ Used as crop desiccant

⁴ CLEARFIELD tolerant lentils only

⁵ Non-Clearfield varieties

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Herbicide Selector Chart – Other Crops

Crop	Knotweed	Kochia	Lamb's-quarters
Beans	Advance 10G Bonanza Rival Treflan	Edge	Basagran Basagran Forte Bonanza
Check label			Edge Eptam
Canary Seed	Sword Target Tracker XP	Badge Banvel II + MCPA Bromotril Brotex 240 Buctril M Koril Logic M	Mextrol Pardner Prestige Sword Target Tracker XP
			Badge Bromotril Brotex 240 Buctril M Curtail M
Chickpeas			Sencor
Field Corn	DyVel DSp 2,4-D	Badge Bromotril Brotex 240 Buctril M DyVel DSp 2,4-D	Koril Logic M MCPA amine MCPA K-salt Mextrol Pardner
			Aatrex Liquid 480 Aatrex Nine-0 Atrazine Atrazine 480 Badge Basagran Basagran Forte Bromotril Brotex 240 Buctril M
			Clovitox Plus Clovitox 600 DyVel DSp 2,4-D 2,4-DB Embutox Koril Laddok Logic M MCPA amine
			MCPA K-salt MCPA Na-salt Mextrol Pardner Primextra II Magnum Princep Nine-T Topside Tropotox Plus
Liberty Link Corn			
Roundup Ready Corn		Glyphosate*	Glyphosate*
Sweet Corn	DyVel DSp	Badge Bromotril Brotex 240 Buctril M DyVel DSp	Koril Logic M Mextrol Pardner
			Aatrex Liquid 480 Aatrex Nine-0 Atrazine Atrazine 480 Badge Basagran
			Basagran Forte Bromotril Brotex 240 Buctril M DyVel DSp
			Koril Laddok Logic M Mextrol Pardner
Fababeans	Advance 10G Bonanza Rival Treflan	Edge	Advance 10G Basagran Basagran Forte
			Bonanza Edge
			Rival Treflan
Lentils	Advance 10G Bonanza Rival Treflan	Edge Odyssey ^{1,2}	Odyssey DLX ^{1,2} Solo ^{1,2}
			Advance 10G Bonanza Odyssey ^{1,2}
			Odyssey DLX ^{1,2} Rival Sencor
			Solo ¹ Treflan
Peas	Advance 10G Bonanza Rival Treflan	Edge MCPA amine Odyssey ¹	Odyssey DLX ¹ Solo ¹ Viper ¹
Check label to ensure chosen chemical or mix is registered for use on the crop			Advance 10G Basagran Basagran Forte Bonanza Clovitox Plus Edge
			MCPA amine MCPA Na-salt Odyssey ¹ Odyssey DLX ¹ Rival Sencor
			Solo Topside Treflan Tropotox Plus Viper
Potatoes Irrigated (irr)			Eptam
			Prism ¹ (irr)
			Sencor

¹ Suppression only

² Pre-emergence to crop, post-emergent to weeds

³ Used as crop desiccant

⁴ CLEARFIELD tolerant lentils only

⁵ Non-Clearfield varieties

* Glyphosate-based chemicals registered for Roundup Ready Corn are Factor 540, Roundup Transorb HC, Roundup Ultra2, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Vantage Plus Max

Herbicide Selector Chart – Other Crops

Crop	Mustards			Night-flowering Catchfly	Perennial Sow-thistle	
Beans	Basagran	Basagran Forte				
Check label						
Canary Seed	Badge Banvel II Bromotril Brotex 240	Buctril M Koril Logic M Mextrol	Pardner Sword Target Tracker XP	Badge Buctril M Logic M Mextrol Sword Target Tracker XP	Badge ¹ Banvel II ¹ Buctril M ¹ Curtail M Logic M	Mextrol ¹ Prestige Sword ¹ Target ¹ Tracker XP ¹
Chickpeas	Sencor					
Field Corn	Aatrex Liquid 480 Aatrex Nine-O Atrazine Atrazine 480 Badge Basagran Basagran Forte Badge Banvel II Bromotril	Brotex 240 Buctril M Clovitox Plus Cobutox 600 DyVel DSp 2,4-D 2,4-DB Embutox Koril Laddok	Logic M MCPA amine MCPA K-salt MCPA Na-salt Mextrol Pardner Primextra II Magnum Topside Tropotox Plus	Badge Buctril M Logic M Mextrol	Badge ¹ Banvel II ¹ Buctril M ¹ Clovitox Plus ¹ Cobutox 600 ¹ 2,4-DB ¹ Embutox Logic M ¹	MCPA Amine ¹ MCPA K-salt ¹ MCPA Na-salt ¹ Mextrol ¹ Princep Nine-T Topside ¹ Tropotox Plus ¹
Liberty Link Corn	Liberty 200 SN					Liberty 200 SN
Roundup Ready Corn	Glyphosate*			Glyphosate*		Glyphosate*
Sweet Corn	Aatrex Liquid 480 Aatrex Nine-O Atrazine Atrazine 480 Badge Basagran	Basagran Forte Bromotril Brotex 240 Buctril M DyVel DSp	Koril Laddok Logic M Mextrol II Pardner	Badge Buctril M Logic M Mextrol	Badge ¹ Buctril M ¹	Logic M Mextrol ¹
Fababeans	Basagran	Basagran Forte				
Lentils	Odyssey ¹	Odyssey DLX ¹	Sencor ¹			
Peas	Basagran Basagran Forte Clovitox Plus MCPA amine MCPA Na-salt	Odyssey Odyssey DLX Pursuit Sencor	Solo Topside Tropotox Plus Viper		Clovitox Plus ¹ MCPA Amine ¹ MCPA Na-salt ¹	Topside ¹ Tropotox Plus ¹
Check label to ensure chosen chemical or mix is registered for use on the crop						
Potatoes Irrigated (irr)	Sencor					

¹ Suppression only

² Pre-emergence to crop, post-emergent to weeds

³ Used as crop desiccant

⁴ CLEARFIELD tolerant lentils only

⁵ Non-Clearfield varieties

* Glyphosate-based chemicals registered for Roundup Ready Corn are Factor 540, Roundup Transorb HC, Roundup Ultra2, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Vantage Plus Max

Herbicide Selector Chart – Other Crops

Crop	Persian Dandel	Prostrate Pigweed	Purslane	Quack Grass
Beans Check label	Advance 10G Arrow 240 EC Bonanza Centurion	Poast Ultra Rival Select Treflan	Edge Eptam Bonanza Edge	Eptam Rival Treflan Arrow 240 EC Assure II Centurion Eptam
Canary Seed			Sword Target Tracker XP	
Chickpeas	Arrow Centurion	Poast Ultra Select		Arrow Assure II Centurion Poast Ultra Select Yuma
Field Corn Check label to ensure chosen chemical or mix is registered for use on the crop			DyVel DSp 2,4-D MCPA K-salt Primextra II Magnum	Aatrex Liquid 480 Atrazine Atrazine 480 Basagran Basagran Forte 2,4-D Laddok MCPA amine MCPA K-salt MCPA Na-salt Primextra II Magnum Princep Nine-T Accent
Liberty Link Corn				Liberty 200 SN
Roundup Ready Corn				Glyphosate*
Sweet Corn				Aatrex Nine-0 Atrazine Atrazine 480 Basagran Basagran Forte Laddok Accent
Fababeans	Advance 10G Edge Poast Ultra	Rival Treflan	Edge	Advance 10G Basagran Basagran Forte Bonanza Edge Rival Treflan Poast Ultra
Lentils	Advance 10G Arrow 240 EC Bonanza Centurion Fusion Odyssey ¹ Odyssey DLX ¹	Poast Ultra Rival Select Solo ² Treflan	Edge	Advance 10G Bonanza Edge Arrow 240 EC Assure II Centurion Equinox Poast Ultra Select Yuma
Peas Check label to ensure chosen chemical or mix is registered for use on the crop	Advance 10G Arrow 240 EC Bonanza Centurion Fusion Odyssey Odyssey DLX	Poast Ultra Rival Select Treflan Viper	Edge	Advance 10G Basagran Basagran Forte Bonanza Edge MCPA amine MCPA Na-salt Rival Treflan Arrow 240 EC Assure II Centurion Equinox Poast Ultra Select Yuma
Potatoes Irrigated (irr)	Arrow 240 EC Centurion Poast Ultra	Select	Eptam	Eptam Arrow 240 EC Centurion Eptam Poast Ultra Prism (irr) Select

¹ Suppression only

² Pre-emergence to crop, post-emergent to weeds

³ Used as crop desiccant

⁴ CLEARFIELD tolerant lentils only

⁵ Non-Clearfield varieties

* Glyphosate-based chemicals registered for Roundup Ready Corn are Factor 540, Roundup Transorb HC, Roundup Ultra2, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Vantage Plus Max

Herbicide Selector Chart – Other Crops

Crop	Redroot Pigweed		Russian Thistle		Shepherd's Purse	
Beans Check label	Advance 10G Basagran ¹ Basagran Forte ¹ Bonanza Dual II Magnum	Edge Eptam Rival Trellan	Basagran ¹ Basagran Forte ¹ Edge ¹	Rival	Basagran Basagran Forte	
Canary Seed	Badge Banvel II Banvel II + MCPA Basagran ¹ Buctril M Curtail M Laddok	Logic M Mextrol Prestige Sword Target Tracker XP	Badge Banvel II + MCPA Bromotril Brotex 240 Buctril M Koril	Logic M Mextrol Pardner Sword Target Tracker XP	Badge Banvel II + MCPA Buctril M Curtail M Logic M	Mextrol Prestige Sword Target Tracker XP
Chickpeas						
Field Corn	Aatrex Liquid 480 Aatrex Nine-O Atrazine Atrazine 480 Badge Banvel II Basagran ¹ Basagran Forte ¹ Buctril M Clovitox Plus Cobutox 600 Dual II Magnum ¹ DyVel DSp	2,4-D 2,4-DB Embutox Logic M MCPA amine MCPA K-salt MCPA Na-salt Mextrol Primextra II Magnum Topside Tropotox	Badge Basagran ¹ Basagran Forte ¹ Bromotril Brotex 240 Buctril M 2,4-D	DyVel DSp Koril Laddok Logic M Mextrol Pardner	Badge Basagran Basagran Forte Buctril M Clovitox Plus Cobutox 600 DyVel DSp 2,4-D 2,4-D B	Embutox Logic M MCPA amine MCPA K-salts MCPA Na-salt Mextrol Topside Tropotox Plus
Liberty Link Corn	Liberty 200 SN				Liberty 200 SN	
Roundup Ready Corn	Glyphosate*		Glyphosate*			
Sweet Corn	Aatrex Liquid 480 Aatrex Nine-O Atrazine Atrazine 480 Badge Basagran ¹ Basagran Forte ¹	Buctril M Dual II Magnum ^{1,2} DyVel DSp Laddok Logic M Mextrol	Badge Basagran ¹ Basagran Forte ¹ Bromotril Brotex 240 Buctril M	DyVel DSp Koril Laddok Logic M Mextrol Pardner	Badge Basagran Basagran Forte	Buctril M DyVel DSp Logic M Mextrol
Fababeans	Basagran ¹ Basagran Forte ¹	Edge	Basagran ¹ Basagran Forte ¹	Edge Rival	Basagran Basagran Forte	
Lentils	Edge Odyssey ⁴	Odyssey DLX ⁴ Solo ⁴	Advance 10G Bonanza Odyssey ⁴ Odyssey DLX ⁴	Reglone ³ Rival Sencor	Odyssey ⁴ Odyssey DLX ^{4,5}	Solo ⁴
Peas Check label to ensure chosen chemical or mix is registered for use on the crop	Basagran ¹ Basagran Forte ¹ Clovitox Plus Edge MCPA amine MCPA Na-salt Odyssey	Odyssey DLX Pursuit Solo Topside Tropotox Plus Viper	Basagran ¹ Basagran Forte ¹ Edge ¹	Odyssey Odyssey DLX Rival	Basagran Basagran Forte Clovitox Plus MCPA amine MCPA Na-salt Odyssey	Odyssey DLX ¹ Pursuit Solo Topside Tropotox Plus Viper
Potatoes Irrigated (irr)	Dual II Magnum Eptam	Prism (irr) Sencor			Sencor	

¹ Suppression only

² Pre-emergence to crop, post-emergent to weeds

³ Used as crop desiccant

⁴ CLEARFIELD tolerant lentils only

⁵ Non-Clearfield varieties

* Glyphosate-based chemicals registered for Roundup Ready Corn are Factor 540, Roundup Transorb HC, Roundup Ultra2, Roundup WeatherMax, R/T 540, Sharpshooter Plus, Vantage Plus Max

Herbicide Selector Chart – Other Crops

Crop	Stinkweed	Tartary Buckwheat	Volunteer Cereals	Volunteer Oats
Beans Check label	Basagran Basagran Forte		Arrow 240 EC Assure II Centurion Edge ¹	Eptam Poast Ultra Select Yuma Arrow 240 EC Assure II Centurion Eptam Poast Ultra Select Yuma
Canary Seed	Badge Bromotril Brotex 240 Buctril M Curtail M Koril Logic M	Mextrol Pardner Prestige Sword Target Tracker XP	Badge Banvel II Banvel II + MCPA Bromotril Brotex 240 Buctril M Curtail M Koril	Logic M Mextrol Pardner Prestige Sword Target Tracker XP
Chickpeas	Sencor	Sencor	Arrow Assure II Centurion	Poast Ultra Select Yuma Arrow Assure II Centurion Poast Ultra Select Yuma
Field Corn	Badge Basagran Basagran Forte Bromotril Brotex 240 Buctril M Clovitox Plus Cobutox 600 2,4-D 2,4-DB DyVel DSp	Embutox Koril Logic M MCPA amine MCPA K-salt MCPA Na-salt Mextrol Pardner Topside Tropotox Plus	Badge Banvel II Bromotril Brotex 240 Buctril M DyVel DSp Koril	Logic M MCPA Amine ¹ MCPA K-salt ¹ MCPA Na-salt ¹ Mextrol Pardner
Liberty Link Corn	Liberty 200 SN			
Roundup Ready Corn	Glyphosate*		Glyphosate*	Glyphosate*
Sweet Corn	Badge Basagran Basagran Forte Bromotril Brotex 240 Buctril M	DyVel DSp Koril Logic M Mextrol Pardner	Badge Bromotril Brotex 240 Buctril M DyVel DSp	Koril Logic M Mextrol Pardner
Fababeans	Basagran Basagran Forte			Edge Poast Ultra Poast Ultra
Lentils	Odyssey ⁴ Odyssey DLX ⁴	Sencor Solo ⁴	Sencor	Arrow 240 EC Assure II Centurion Edge Equinox (wheat, barley) Fusion Odyssey ⁴ DLX ⁴ Poast Ultra Select Solo ⁴ Yuma
Peas Check label to ensure chosen chemical or mix is registered for use on the crop	Basagran Basagran Forte Clovitox Plus MCPA amine MCPA Na-salt Odyssey Odyssey DLX	Pursuit Sencor Solo Topside Tropotox Plus Viper	MCPA Amine ¹ MCPA Na-salt ¹	Sencor Arrow 240 EC Assure II Centurion Edge ¹ Equinox (wheat, barley) Fusion Odyssey ⁴
Potatoes Irrigated (irr)	Sencor	Sencor	Arrow 240 EC Centurion Eptam	Poast Ultra Select Arrow 240 EC Assure II Centurion Eptam Poast Ultra Select

¹ Suppression only

² Pre-emergence to crop, post-emergent to weeds

³ Used as crop desiccant

⁴ CLEARFIELD tolerant lentils only

⁵ Non-Clearfield varieties

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Herbicide Selector Chart – Other Crops

Crop	Volunteer Canola		Wild Buckwheat		Wild Oats		Wild Radish
Beans Check label	Basagran Basagran Forte		Advance 10G Bonanza Edge	Rival Treflan	Arrow 240 EC Assure II Bonanza Centurion Edge	Eptam Poast Ultra Rival Select Treflan Yuma	Basagran Basagran Forte
Canary Seed	Badge Banvel II + MCPA Buctril M Curtail M Logic M	Mextrol Sword Prestige Target Tracker XP	Badge Banvel II Banvel II + MCPA Bromotril Brotex 240 Buctril M Curtail M	Koril Logic M Mextrol Pardner Prestige Sword Target Tracker XP			Banvel II + MCPA
Chickpeas	Sencor				Arrow Assure II Centurion	Poast Ultra Select Yuma	
Field Corn	Badge Basagran Basagran Forte Buctril M Clovitox Plus	DyVel DS ² 2,4-D Logic M Mextrol Tropotox Plus	Aatrex Liquid 480 Aatrex Nine-0 Atrazine Atrazine 480 Badge Banvel II Bromotril Brotex 240 Buctril M Cobutox 600 2,4-D	2,4-DB DyVel DS ² Embutox ¹ Koril Logic M MCPA Amine ¹ MCPA K-salt ¹ MCPA Na-salt ¹ Mextrol Pardner Princep Nine-T	Aatrex Liquid 480 Aatrex Nine-0 Accent	Atrazine Atrazine 480 Princep Nine-T	Basagran Basagran Forte Clovitox Plus ¹ Cobutox 600 2,4-D MCPA amine MCPA K-salt MCPA Na-salt Topside Tropotox Plus
Liberty Link Corn			Liberty 200 SN		Liberty 200 SN		
Roundup Ready Corn	Glyphosate*		Glyphosate*		Glyphosate*		
Sweet Corn	Badge Basagran Basagran Forte	Buctril M DyVel DS ² Mextrol	Aatrex Liquid 480 Aatrex Nine-0 Atrazine Atrazine 480 Badge Bromotril	Brotex 240 Buctril M DyVel DS ² Koril Mextrol Pardner	Aatrex Liquid 480 Aatrex Nine-0 Accent	Atrazine Atrazine 480	Basagran Basagran Forte
Fababeans	Basagran Basagran Forte		Advance 10G Bonanza Edge	Rival Treflan	Advance 10G Bonanza Edge	Poast Ultra Rival Treflan	Basagran Basagran Forte
Lentils	Odyssey ⁴ Odyssey DLX ⁴	Sencor Solo ^{4,5}	Advance 10G Bonanza Edge Odyssey ⁴	Odyssey DLX ^{4,1} Solo ^{1,4} Rival Treflan	Advance 10G Arrow 240 EC Assure II Bonanza Centurion Edge Equinox Fusion	Odyssey ⁴ Odyssey DLX ⁴ Poast Ultra Rival Select Solo ⁴ Treflan Yuma	
Peas Check label to ensure chosen chemical or mix is registered for use on the crop	Clovitox Plus Basagran Basagran Forte Odyssey ³ Odyssey DLX ³	Pursuit ⁵ Sencor Solo ⁵ Tropotox Plus Viper	Advance 10G Bonanza Edge MCPA Amine ¹ MCPA Na-salt ¹ Odyssey ¹	Odyssey DLX ¹ Pursuit Rival Solo ¹ Treflan Viper ¹	Advance 10G Arrow 240 EC Assure II Avadex BW Bonanza Centurion Edge Equinox Fusion Odyssey	Odyssey DLX Poast Ultra Pursuit Rival Select Solo Treflan Viper Yuma	Basagran Basagran Forte Clovitox Plus ¹ MCPA amine MCPA Na-salt Topside Tropotox Plus
Potatoes Irrigated (irr)	Sencor				Arrow 240 EC Centurion Eptam	Poast Ultra Select	

¹ Suppression only

² Pre-emergence to crop, post-emergent to weeds

³ Used as crop desiccant

⁴ CLEARFIELD tolerant lentils only

⁵ Non-Clearfield varieties

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Insecticide Selector Chart

Beetles							
Crop	Blister	Cabbage Seedpod Weevil	Colorado Potato	Flea		Red Turnip	Sunflower Beetle
Barley, Oats, Wheat							
Rye				Poncho			
Field Corn (FC) Sweet Corn (SC)							
Alfalfa	Sevin						
Clover	Sevin						
Pasture							
Canola		Decis Matador Silencer		Decis Furadan Fyfanon Gaucho 480 Gaucho CS Helix ¹ Helix XTra ¹	Malathion Matador Poncho Prosper Prosper FX Ripcord Sevin Silencer	Furadan	
Flax							
Mustard		Decis Matador Silencer		Decis Furadan Fyfanon Gaucho 480 Gaucho CS Helix ¹	Helix XTra ¹ Malathion Matador Sevin Silencer	Furadan	
Sunflower							Decis Endosulfan Furadan Matador Ripcord Silencer Thiodan Thionex
Sugar Beets				Fyfanon	Malathion		
Peas							
Potato			Actara Admire Alias Assail 70 WP Citadel 480 EC Clutch Coragen Decis Diazinon Dibrom Endosulfan Furadan Fyfanon Genesis Grapple	Imidan Lorsban Malathion Matador Monitor Nufos Pounce Pyrinex Ripcord Rmon Sevin Silencer Thiodan Thionex	Admire Alias Citadel 480 EC Decis Diazinon Dibrom Endosulfan Furadan Genesis Grapple Imidan Lannate	Lorsban Matador Monitor Nufos Orthene Pounce Pyrinex Ripcord Sevin Silencer Thiodan Thionex	

¹ Commercial seed treatment only

For more detailed selector chart information, visit www.agriculture.alberta.ca/pesticide

Insecticide Selector Chart

Stored Grain Insects			Butterflies & Moths				
Crop	Flour Beetles, Grain Beetles, Mediterranean Flour Moth	Alfalfa Looper	Armyworms		Bertha Armyworm (BA) Clover Cutworm (CC)		Webworms
Barley, Oats, Wheat	Malathion Phostoxin		Citadel 480 EC Fyfanon Lannate Lorsban	Malathion Nufos Pyrinex Sevin	Citadel 480 EC		Sevin
Rye	Malathion Phostoxin		Fyfanon Malathion	Sevin			Sevin
Field Corn (FC) Sweet Corn (SC)	Malathion (FC) Phostoxin		Matador Pounce (SC)	Sevin Silencer			
Alfalfa		Dibrom	Sevin				Sevin
Clover		Dibrom	Sevin				Sevin
Pasture		Dibrom					
Canola		Citadel 480 EC Lannate Lorsban Nufos Pyrinex	Citadel 480 EC Lorsban	Nufos Pyrinex	Citadel 480 EC (BA) Decis Lannate Lorsban (BA) Matador (BA)	Monitor (BA) Nufos (BA) Pyrinex (BA) Ripcord (BA) Silencer (BA)	Decis Lannate
Flax			Lorsban	Nufos	Citadel 480 EC (BA) Decis (CC) Lannate (BA)	Lorsban (BA) Nufos (BA) Pyrinex (BA)	Decis
Lentils							
Mustard			Sevin		Decis		Decis
Sunflower							
Sugar Beets							Endosulfan Thiodan Thionex
Peas		Dibrom Lannate Sevin					
Potato		Dibrom	Sevin				

¹ Commercial seed treatment only

Insecticide Selector Chart

Crop	Cutworms – Army (A), Pale Western (PW), Red-backed (RB)		Butterflies & Moths	
			Diamond-back Moth Larvae	European Corn Borer (ECB) or Corn Earworm (CE)
Barley, Oats, Wheat	Ambush Citadel 480 EC Decis Lorsban	Nufos Pounce Pyrinex Ripcord (B,W)		
Rye	Pounce			
Field Corn (FC) Sweet Corn (SC)	Citadel 480 EC (RB) Lorsban (RB) Matador Nufos (RB)	Pounce Pyrinex (RB) Ripcord Silencer		Decis (ECB, CE) Endosulfan (CE) Furadan (ECB) Lannate (ECB, CE) Malathion (ECB, CE) Matador Orthene Pounce (CE) Ripcord Sevin Silencer Thiodan (CE) Thionex (CE)
Alfalfa				
Clover				
Pasture				
Canola	Ambush Citadel 480 EC Lorsban	Nufos Pounce Pyrinex	Citadel 480 EC Decis Lorsban Matador Malathion Nufos Pyrinex Silencer	
Flax	Citadel 480 EC Decis Lorsban	Nufos Pounce Pyrinex		
Lentils	Citadel 480 EC (PW) Decis Lorsban (PW)	Nufos (PW) Pounce Pyrinex (PW)		
Mustard			Decis Malathion Sevin	
Sunflower	Citadel 480 EC Lorsban Nufos	Pounce Pyrinex		
Sugar Beets	Citadel 480 EC (PW,RB) Decis Lorsban (PW,RB)	Nufos (PW,RB) Pounce Pyrinex (PW,RB)		
Peas	Matador Pounce	Silencer		
Potato	Citadel 480 EC (RB) Lorsban (RB) Nufos (RB)	Pyrinex (RB) Ripcord Pounce		Coragen (ECB) Rimon (ECB) Sevin (ECB)

¹ Commercial seed treatment only

For more detailed selector chart information, visit www.agriculture.alberta.ca/pesticide

Insecticide Selector Chart

Crop	Flies		Grasshoppers			Plant Bugs	
	Root Maggots – Seed Corn(SC) Sugar Beet(SB)	Wheat Midge	Clear winged, Migratory, Two-striped			Alfalfa (A), Lygus (L), Stink (S), Tarnished (T)	
Barley, Oats, Wheat		Citadel 480 EC Cygon Lagon 480E Lorsban Nufos Pyrinex	Citadel 480 EC Cygon Decis ECO Bait Lagon 480E	Lorsban Malathion Matador Nufos	Pyrinex Ripcord Sevin Silencer	Cygon (S) Lagon 480E (S)	
Rye			Cygon ECO Bait	Lagon 480E Malathion	Sevin	Lagon 480E (S)	
Field Corn (FC) Sweet Corn (SC)	Counter Diazinon (SC) Poncho (SC)		ECO Bait	Sevin			
Alfalfa			Cygon ECO Bait Dibrom	Lagon 480E Matador Malathion	Sevin Silencer	Cygon (L) Decis (L)* Dibrom (L) * Seed Production Only	Lagon 480E Malathion (L) Matador (L, T)
Clover			Cygon ECO Bait	Dibrom Lagon 480E	Malathion Sevin	Cygon (L) Dibrom (L)	
Pasture			Cygon Decis ECO Bait	Dibrom Lagon 480E Malathion	Matador Sevin Silencer	Cygon(L)	
Canola			Citadel 480 EC Cygon ECO Bait Lagon 480E	Lorsban Malathion Matador Monitor	Nufos Pyrinex Ripcord Silencer	Citadel 480 EC (L) Decis (L) Lorsban (L)	Nufos (L) Matador (L) Pyrinex (L)
Flax			Decis Malathion	Matador	Silencer		
Lentils			Citadel 480 EC Decis	Lorsban Malathion	Nufos Pyrinex		
Mustard			Malathion	Matador	Silencer	Decis (L) Matador (L)	Sevin (L, S) Silencer (L)
Sunflower							
Sugar Beets	Counter (SB) Furadan						
Peas			Matador				
Potato	Diazinon (SC)		Diazinon			Citadel 480 EC (T) Decis (T) Endosulfan (T) Furadan (T) Lagon 480E (T) Lorsban (T) Matador (T) Nufos (T)	Orthene (T) Pounce (T) Pyrinex (T) Thionex (T) Sevin (S, T) Silencer (T) Ripcord (T) Thiodan (T)

* Commercial seed treatment only

Insecticide Selector Chart

Crop	Mites	Sucking Insects					
	Brown Wheat, Two-spotted, Winter Grain	Aphid – Buckthorn, Corn Leaf, Green Bug, Green Peach, English Grain, Pea, Potato Foxglove, Russian	Leafhoppers			Spittlebugs	
Barley, Oats, Wheat	Citadel 480 EC Lorsban Malathion Nufos Pyrinex	Citadel 480 EC Cygon Lorsban	Malathion Nufos Pyrinex				
Rye	Malathion	Malathion					
Field Corn (FC) Sweet Corn (SC)		Endosulfan Lannate	Thiodan Thionex				
Alfalfa		Cygon Dibrom Lagon 480E	Malathion Matador Silencer	Cygon Dibrom	Lagon 480E Malathion	Sevin Matador	Endosulfan Malathion Thiodan Thionex
Clover		Cygon Dibrom	Lagon 480E Malathion	Dibrom	Malathion	Sevin	Endosulfan Malathion Thiodan Thionex
Pasture		Cygon	Lagon 480E	Cygon			
Canola		Cygon	Lagon 480E	Cygon	Lagon 480E		
Flax		Cygon	Lagon 480E				
Mustard				Sevin			
Sunflower							
Sugar Beets		Endosulfan Thiodan	Thionex	Dibrom			
Peas		Cygon Dibrom Endosulfan Lagon 480E Lannate	Malathion Matador Silencer Thiodan Thionex	Malathion			
Potato		Actara Admire Alias Assail 70 WP Clutch Cygon Diazinon Endosulfan Grapple	Imidan Lannate Lannate Lagon 480E Malathion Monitor Movento Orthene Thiodan Thionex	Actara Admire Alias Clutch Cygon Decis Diazinon Dibrom	Endosulfan Furadan Genesis Grapple Imidan Lagon 480E Lannate Malathion	Matador Monitor Orthene Pounce Ripcord Sevin Thiodan Thionex	

¹ Commercial seed treatment only

For more detailed selector chart information, visit www.agriculture.alberta.ca/pesticide

Insecticide Selector Chart

Crop	Thrips	Weevils		Wireworms
	Barley, Grass, Red Clover	Alfalfa (A), Cabbage Seed Pod (CSP), Pea (P), Pea Leaf (PL), Seed (SD), Sunflower (S), Sweet Clover (SC)		
Barley, Oats, Wheat	Cygon Lagon 480E Lannate			Cruiser (W, B)
Rye				
Field Corn (FC) Sweet Corn (SC)				Poncho
Alfalfa		Cygon (A,SC) Decis* (A,SD) Fyfanon (A) Imidan (A) *Seed production only	Lagon 480E (A) Malathion (A) Matador (A)	
Clover		Cygon (A,SC) Fyfanon (SC)	Lagon 480E (SC) Malathion (A,SC)	
Pasture		Cygon (A,SC)		
Canola		Matador (CSP)		
Flax				
Mustard				
Sunflower		Lorsban (SD) Nufos (SD)	Ripcord (S,SD)	
Sugar Beets				Counter
Peas		Endosulfan (P) Malathion Matador (PL)	Thiodan (P) Thionex (P)	
Potato				

* Commercial seed treatment only

Fungicide – Seed Treatment Selector Chart

Crop	Blackleg	Bunt – Stinking Smut	Damping Off	Fusarium Seedling Blight	Root Rot
Barley			Dividend XL RTA Gemini Maxim PSP Raxil MD	Charter Charter RTU Dividend XL RTA Gemini Rancona Apex Raxil T	Charter ¹ Charter RTU ² DB Red L Dividend XL RTA ² Gemini ² Rancona Apex ² Raxil MD ² Raxil T ²
Wheat		Charter Charter RTU DB Red L Dividend XL RTA Rancona Apex Raxil MD Raxil T Vitalflo 280	Apron FL Dividend XL RTA Gemini Maxim PSP Raxil MD	Charter Charter RTU DB Red L Dividend XL RTA Gemini Rancona Apex Raxil MD Raxil T	Charter ¹ Charter RTU ² DB Red L Dividend XL RTA ² Gemini ² Rancona Apex ² Raxil MD ² Raxil T ²
Oats			Dividend XL RTA Maxim PSP Raxil MD	Charter Charter RTU Rancona Apex Raxil MD Raxil T	Charter ¹ Charter RTU ² DB Red L Dividend XL RTA Rancona Apex ² Raxil MD ²
Rye			Dividend XL RTA Maxim PSP Vitalflo 280	Rancona Apex	DB Red L Dividend XL RTA Rancona Apex ²
Brome Grass			Apron FL ¹		
Canola	Helix ¹ Helix XTra ¹		Apron FL ¹ Gaucho ¹ Helix ¹ Helix XTra ¹		
Flax					
Mustard	Helix ¹ Helix XTra ¹		Gaucho ¹ Helix ¹ Helix XTra ¹ Thiram 75WP		
Sweet Corn			Captan Thiram 75WP		Captan DCT

¹ Commercial seed treatment only

² Suppression only

³ Seed-borne

Fungicide – Seed Treatment Selector Chart

Crop	Seedling Blight	Seed Rot	Smut – Covered (C), False Loose (FL), Head (H), Loose (L), True Loose (TL)	Stem Smut	Take All
Barley	Allegiance FL ¹ Apron FL ¹ Charter Charter RTU Dividend XL RTA Gemini Maxim PSP Rancona Apex Raxil MD Raxil T Vitalflo 280	Allegiance FL ¹ Apron FL Charter Charter RTU Dividend XL RTA Gemini Rancona Apex Raxil MD Raxil T Thiram 75WP Vitalflo 280	Charter (FL,C,TL) Dividend XL RTA (C,FL) Gemini (TL,FL,C) Rancona Apex (TL, C, FL) Raxil MD (C, FL, TL) Raxil T (C,FL,L) Vitalflo 280 (FL,C,TL)		Dividend XL RTA
Wheat	Allegiance FL ¹ Apron FL Charter Charter RTU DB Red L Dividend XL RTA Gemini Maxim PSP Rancona Apex Raxil MD ² Raxil T Thiram 75WP	Allegiance FL ¹ Apron FL Charter Charter RTU Dividend XL RTA Gemini Rancona Apex Raxil MD Raxil T Thiram 75WP Vitalflo 280	Charter (L) Charter RTU (L) Dividend XL RTA (L) Gemini (TL) Rancona Apex (L) Raxil MD (L) Raxil T (L) Vitalflo 280 (L)		Dividend XL RTA ³
Oats	Allegiance FL ¹ Apron FL Dividend XL RTA Maxim PSP Rancona Apex Raxil MD ² Raxil T Thiram 75WP Vitalflo 280	Allegiance FL ¹ Apron FL Dividend XL RTA Rancona Apex Raxil MD Raxil T Thiram 75WP Vitalflo 280	Charter (L,C) Charter RTU (L,C) Dividend XL RTA (L,C) Gemini (C,L) Raxil MD (C, L) Raxil T (L) Vitalflo 280 (C,L)		
Rye	Allegiance FL ¹ Apron FL DB Red L Dividend XL RTA Maxim PSP Rancona Apex Vitalflo 280	Allegiance FL ¹ Apron FL ¹ Dividend XL RTA Rancona Apex Vitalflo 280		Vitalflo 280	
Brome Grass	Allegiance FL Apron FL ¹	Allegiance FL Apron FL ¹			
Canola	Allegiance FL ¹ Apron FL ¹ Gaucho ¹ Helix ¹ Helix XTra ¹	Allegiance FL ¹ Apron FL Gaucho ¹ Helix ¹ Helix XTra ¹			
Flax	Vitalflo 280	Vitalflo 280			
Mustard	Gaucho ¹ Helix ¹ Helix XTra ¹ Thiram 75WP	Gaucho ¹ Helix ¹ Helix XTra ¹			
Sweet Corn	Apron FL ¹ Captain DCT Thiram 75WP	Apron FL ¹			

- ¹ Commercial seed treatment only
² Suppression only
³ Seed borne

Fungicide – Seed Treatment Selector Chart

Crop	Blackleg	Damping Off	Fusarium Decay	Root Rot	Seedling Blight	Seed Rot	Verticillium Wilt Silver Scurf
Peas		Apron FL ¹ Apron Maxx RTA Captan FL Thiram 75WP Trilex AL		Captan FL	Allegiance FL ¹ Apron FL ¹ Apron Maxx RTA Captan FL Thiram 75WP Vitalflo 280	Allegiance FL ¹ Apron FL ¹ Apron Maxx RTA Trilex AL Vitalflo 280	
Potato	Senator PSPT		MancoPlus Penncozeb 75DF, 80WP Polyram 16D Senator PSPT Tuberseal				Maxim PSP Maxim MZ PSP Senator PSPT
Soybean		Agrox B-2 Apron FL ¹ Apron Maxx RTA Captan FL Maxim PSP Thiram 75WP Trilex AL		Apron FL ¹ Captan FL	Allegiance FL ¹ Agrox B-2 Apron FL ¹ Apron Maxx RTA Captan FL Maxim PSP Thiram 75WP Vitalflo 280	Allegiance FL ¹ Agrox B-2 Apron Maxx RTA Vitalflo 280	
Sugar Beets		Apron FL ¹ Captan FL Thiram 75WP		Captan FL	Allegiance FL ¹ Apron FL ¹ Captan FL Thiram 75WP	Allegiance FL ¹	

¹ Commercial seed treatment only

² Suppression only

³ Seed-borne

Fungicide – Seed Treatment Selector Chart

Crop	Anthracnose	Ascochyta	Black Scurf	Botrytis	Downy Mildew	Fusarium Dry Rot
Beans (Dry, Snap)	Apron FL ¹ Apron Maxx RTA DCT Vitallo 280	Quadris				
Chickpeas		Headline EC ² Proline 480				
Cole Crops: (Broccoli, Brussel Sprouts, Cabbage, Cauliflower)						
Field Corn (FC) Sweet Corn (SC)						
Grasses						
Lentils		Apron Maxx RTA Crown		Apron Maxx RTA		
Potato			Maxim PSP			Maxim PSP
Safflower						
Seed Alfalfa						
Sunflower					Apron FL ¹	

¹ Commercial seed treatment only

² Suppression only

³ Seed-borne

⁴ Must be mixed with Lance for Ascochyta control in chickpeas

Fungicide - Seed Treatment Selector Chart

Crop	Root Rot	Seedling Blight Seed Rot Damping Off	Silver Scurf (<i>Helmenthosporium Solani</i>)	Verticillium Wilt
Beans (Dry, Snap)	Apron FL ¹ Captan FL DCT	Apron FL ¹ Apron Maxx RTA Captan FL DCT Maxim PSP Thiram 75WP Trilex AL Vitalfo 280		
Chickpeas		Trilex AL Apron Maxx RTA		
Cole Crops: (Broccoli, Brussel Sprouts, Cabbage, Cauliflower)		Maxim PSP Thiram 75 WP		
Field Corn (FC) Sweet Corn (SC)	Captan FL DCT (SC) Manzate 200, 75DF, Pro-stick	Apron FL ¹ Captan FL Manzate 200, 75DF, Pro-stick Maxim PSP Penncozeb 75DF, 80WP Thiram 75WP (SC) Vitalfo 280		
Grasses		Apron FL ¹ Maxim PSP Thiram 75WP		
Lentils		Apron FL ¹ Apron Maxx RTA Crown Maxim PSP Trilex AL Vitalfo 280		
Potato			Maxim PSP	
Safflower		Maxim PSP Thiram 75WP		
Seed Alfalfa		Apron FL ¹		Thiram 75WP
Sunflower		Apron FL ¹ Maxim PSP		

¹ Commercial seed treatment only

² Suppression only

³ Seed-borne

⁴ Must be mixed with Lance for *Ascochyta* control in chickpeas

Fungicide – Foliar Treatment Selector Chart

Crop	Alternaria/ Black Spot	Blackleg	Crown Rust	Fusarium Head Blight	Leaf Rust	Net Blotch	Powdery Mildew
Barley				Proline 480 ²	Bumper 418 EC Pivot 418 EC Quilt Tilt 250 E	Bumper 418 EC Headline EC Pivot 418 EC Proline 480 Quilt Stratego 250 EC Tilt 250E	Bumper 418 EC Pivot 418 EC Tilt 250 E
Wheat				Bravo 500 ² Folicur 432 F ² Proline 480 ²	Bumper 418 EC Dithane DG 75 Folicur 432 F Headline EC Manzate 200, 75DF, Pro-stick Pivot 418 EC Penncozeb 75DF, 80WP Proline 480 Quilt Stratego 250 EC Tilt 250 E		Bumper 418 EC Folicur 432 F Headline EC Pivot 418 EC Stratego 250 EC Tilt 250 E
Oats			Bumper 418 EC Headline EC Pivot 418 EC Stratego 250 EC Tilt 250 E				
Rye					Headline EC		Headline EC
Brome Grass							
Canola	Lance Quadris Rovral Flo ² Rovral RX ²	Bumper 418 EC Pivot 418 EC Quadris Tilt 250 E					
Flax							
Mustard							
Cucumber							Kumulus DF
Peas							Headline EC Kumulus DF

¹ Commercial seed treatment only

² Suppression only

³ Seed-borne

Fungicide – Foliar Treatment Selector Chart

Crop	Scald	Sclerotinia Stem Rot	Septoria Leaf Blotch	Stem Rust	Stripe Rust	Tan Spot
Barley	Bumper 418 EC Headline EC Pivot 418 EC Proline 480 Quilt Stratego 250 EC Tilt 250 EC		Bumper 418 EC Parasol TM Pivot 418 EC Quilt Stratego 250 EC Tilt 250E	Bumper 418 EC Pivot 418 EC Tilt 250 E	Headline EC Quilt	
Wheat			Bravo 500 Bumper 418 EC Dithane DG 75 Dividend XL RTA Folicur 432 F Manzate 200, 75DF, Pro-stick Parasol TM Penncozeb 75DF, 80WP Pivot 418 EC Quilt Stratego 250 EC Tilt 250 E	Bumper 418 EC Folicur 432 F Pivot 418 EC Stratego 250 EC Tilt 250 E	Bumper 418 EC Folicur 432 F Headline EC Pivot 418 EC Quilt Stratego 250 EC Tilt 250 E	Bravo 500 Bumper 418 EC Dithane DG 75 Folicur 432 F Headline EC Manzate 200, 75DF, Pro-stick Penncozeb 75DF, 80WP Pivot 418 EC Proline 480 Quilt Stratego 250 EC Tilt 250 E
Oats			Bumper 418 EC Pivot 418 EC Stratego 250 EC Tilt 250 E			
Rye						
Brome Grass						
Canola		Lance Proline 480 Quadris Rovral Flo Rovral RX Serenade ASO				
Flax		Proline 480				
Mustard		Proline 480				
Cucumber						
Peas						

¹ Commercial seed treatment only

² Suppression only

³ Seed-borne

For more detailed selector chart information, visit www.agriculture.alberta.ca/pesticide

Fungicide – Foliar Treatment Selector Chart

Crop	Ascochyta Leaf Blight	Asian Rust	Botrytis Vine Rot	Cercospora Leaf Spot	Common Scab
Peas	Bravo 500				
Potato	Headline EC Quadris		Bravo 500 Ridomil Gold		Polyram 16D
Soybean		Tilt 250E		Bumper 418 EC Pivot 418 EC Tilt 250E	
Sugar Beets				Headline EC Manzate 200, 75DF, Pro-stick Polyram DF Parasol WP/FL Penncozeb 75DF, 80WP	

¹ Commercial seed treatment only

² Suppression only

³ Seed-borne

For more detailed selector chart information, visit www.agriculture.alberta.ca/pesticide

Fungicide – Foliar Treatment Selector Chart

Crop	Early Blight	Late Blight	Powdery Mildew	Verticillium Wilt Silver Scurf
Peas			Headline EC Kumulus DF	
Potato	Bravo 500 Copper Spray Dithane DG 75 Gavel 75 DF Headline EC Lance Manzate 200, 75DF, Pro-stick Parasol WP/FL Polyram DF Quadris Ridomil Gold Ridomil Gold MZ 68WP Scala Serenade ASO Tanos 50 DF	Acrobat 50 WP Allegro 500F Bravo 500 Copper Spray Curzate 60 DF Dithane DG 75 Gavel 75 DF Headline Manzate 200, 75DF, Pro-stick Parasol TM Parasol WP Penncozeb 75DF, 80WP Polyram DF Quadris Ranman Revus Ridomil Gold Ridomil Gold MZ 68WP Tanos 50 DF Tattoo C		Quadris
Soybean			Tilt 250E	
Sugar Beets			Headline EC	

¹ Commercial seed treatment only

² Suppression only

³ Seed-borne

Fungicide – Foliar Treatment Selector Chart

Crop	Anthracnose	Ascochyta	Botrytis	Downy Mildew	Rust	Sclerotinia
Beans (Dry, Snap)	Headline EC Quadris	Quadris	Ronilan EG Rovral Flo		Headline EC	Lance Ronilan EG Rovral Flo
Chickpeas		Headline EC ¹ Headline Duo Proline 480				
Cole Crops: (Broccoli, Brussel Sprouts, Cabbage, Cauliflower)			Parasol WP/FL	Bravo 500		
Field Corn (FC) Sweet Corn (SC)					Bravo 500 (SC) Tilt 250 E	
Grasses					Headline EC	
Lentils	Bravo 500 Dithane DG 75 Headline EC Manzate 200, 75DF, Pro-stick Penncozeb 75DF, 80WP	Bravo 500 Dithane DG 75 Headline EC Lance Manzate 200, 75DF, Pro-stick Penncozeb 75DF, 80WP Proline 480				Lance
Potato			Bravo 500 Ridomil Gold			
Safflower						
Seed Alfalfa						Rovral Flo Rovral WP
Sunflower						

¹ Commercial seed treatment only

² Suppression only

³ Seed-borne

⁴ Must be mixed with Lance for Ascochyta control in chickpeas

Pesticide Application Record

Field description: _____ Acres: _____ Crop: _____

Variety: _____ Date seeded: _____ Fertilizer: _____ Rate: _____ Date: _____

Crop stage: _____ Scouting date: _____ Date results were checked: _____

Pest Weed/Insect/Disease		Density				Results	Field Diagram	
Species	Leaf stage/ Instar/Symptom	Patches	Low	Medium	High			

Comments: _____

Application Information							Environment Information			
Pesticide used	Date and time	Rate per acre	Water volume per acre	Acres per tank	Pesticide volume per tank	Tanks per field	Crop stand	Soil moisture	Temp- erature	Wind speed and direction
1 Lot #:							Ex. G. Fr. Pr.	Ex. G. Fr. Pr.		
2 Lot #:							Ex. G. Fr. Pr.	Ex. G. Fr. Pr.		
3 Lot #:							Ex. G. Fr. Pr.	Ex. G. Fr. Pr.		

Comments: _____

Note: Ex. = Excellent G. = Good Fr. = Fair Pr. = Poor

Pesticide Application Record

Field description: _____ Acres: _____ Crop: _____
 Variety: _____ Date seeded: _____ Fertilizer: _____ Rate: _____ Date: _____
 Crop stage: _____ Scouting date: _____ Date results were checked: _____

Pest Weed/Insect/Disease		Density				Results	Field Diagram	
Species	Leaf stage/ Instar/Symptom	Patches	Low	Medium	High			

Comments: _____

Application Information							Environment Information			
Pesticide used	Date and time	Rate per acre	Water volume per acre	Acres per tank	Pesticide volume per tank	Tanks per field	Crop stand	Soil moisture	Temperature	Wind speed and direction
1 Lot #:							Ex. G. Fr. Pr.	Ex. G. Fr. Pr.		
2 Lot #:							Ex. G. Fr. Pr.	Ex. G. Fr. Pr.		
3 Lot #:							Ex. G. Fr. Pr.	Ex. G. Fr. Pr.		

Comments: _____

Note: Ex. = Excellent G. = Good Fr. = Fair Pr. = Poor

Field description: _____ Acres: _____ Crop: _____
 Variety: _____ Date seeded: _____ Fertilizer: _____ Rate: _____ Date: _____
 Crop stage: _____ Scouting date: _____ Date results were checked: _____

[illegible]

Comments: _____

Application Information							Environment Information			
Pesticide used	Date and time	Rate per acre	Water volume per acre	Acres per tank	Pesticide volume per tank	Tanks per field	Crop stand	Soil moisture	Temperature	Wind speed and direction
1 Lot #: _____							Ex. _____ G. _____ Fr. _____ Pr. _____	Ex. _____ G. _____ Fr. _____ Pr. _____		
2 Lot #: _____							Ex. _____ G. _____ Fr. _____ Pr. _____	Ex. _____ G. _____ Fr. _____ Pr. _____		
3 Lot #: _____							Ex. _____ G. _____ Fr. _____ Pr. _____	Ex. _____ G. _____ Fr. _____ Pr. _____		

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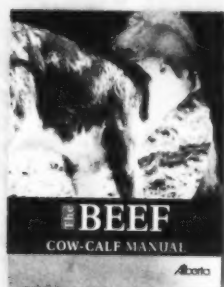
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 - b. name and amount of product
 - c. time poisoning happened
 - d. any symptoms
 - e. circumstances surrounding the incident
 - f. your name and phone number
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6. **Do not attempt any additional first aid unless the Poison Centre has instructed you.**

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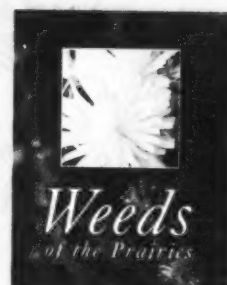
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